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New Year's Resolution for Every Member

□ □ □

Resolved:

That in 1912 I pledge myself to secure at least one new member, to the end that our membership may be doubled, our influence extended, our power for good increased, and the importance of the work the Association is doing be more deeply impressed upon the minds of the great American public.



VIEW OF THE WESTERN SHORE OF LAKE DRUMMOND, DISMAL SWAMP.

American Forestry

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No. 1

THE NATIONAL ASPECT OF SWAMP DRAINAGE*

By M. O. LEIGHTON,

CHIEF HYDROGRAPHER UNITED STATES GEOLOGICAL SURVEY.

THAT which I have to suggest is based on two fundamental principles; first, that natural laws are superior to man-made ones, and when the two kinds are opposed, as they sometimes are, man is very foolish to handicap himself by trying to sustain those of his own make; second that government is merely a means to an end, that end being to enable the people to satisfy their needs and desires in the wisest way. I hold that these two principles do not admit of argument.

Some parts of the earth are not, in their natural condition, well suited to man's occupancy. Man has therefore seen fit to readjust the face of nature to suit his particular needs. In the course of this readjustment he has changed rural conditions into urban ones, has diverted the course of rivers to make the arid places productive, has tunneled mountains, bridged chasms, leveled hills, and even diked off the ocean itself. These and a thousand things more has man performed because nature has not arranged and constructed to his liking. But though nature has shown a cheerful disposition to submit to such changes, she has always insisted that they be made in certain ways. Whosoever violates her laws must finally fail of his purposes. Do you know of any exception to this rule?

This great Congress, of notable record and honorable achievement, typifies the discontent of man with certain of nature's desert conditions. To remedy these, this Congress has advocated the diversion of waters from their natural courses in order that arid land may be made to produce. It is fitting that, having seen this proposition gaining headway at every milestone, with ultimate success as inevitable as the round of the seasons, this Congress should now, with that helpfulness and altruism that has marked its every act, lend a part of its energy toward the conversion of another great natural blot into a place of American homes and fertile fields so that the East and the West, the North and the South may unite in that inspiring demand of the Irrigation Congress, "Make homes on the land."

*From address delivered at Irrigation Congress in Chicago, in December.

The natural blot of which I speak is made up of the swamp lands of the United States. As a nation we require the riches that lie disguised in them. As a people we can not feel that our full duty has been performed until we have made these swamp lands centers of prosperity and comfort for ourselves and those who shall come after. To do this we must again change the face of nature and we must make that change in accordance with nature's laws.

THE CHARACTER OF A SWAMP

What is a swamp? It is merely an area of land which because of some adverse natural conditions, has been deprived of or denied a suitable outlet for its surplus water. That water therefore accumulates in or upon the ground and renders the area too wet for man's comfortable occupation. It also prevents the entrance of air into the ground. Now, air, or the oxygen contained in air, is as essential at the plant roots as it is at the plant leaves, and so it is that in swamps we have a dense wet soil generally stagnant, on which nothing of a very useful character will grow except certain kinds of timber. Food crops, on which we depend for sustenance, can not grow in such soil.

In the case of naturally well drained land nature has provided suitable water outlets at proper grade. In the case of the swamp she has left this undone and the whole function of man in reclaiming swamp lands is to supply that which nature has neglected. In supplying that need, in remedying that defect, we must be governed by precisely the same laws that nature followed with respect to lands that receive here complete attention. Look at any well-drained river basin, you will find that the main stream and its tributaries are harmoniously adjusted to each other with respect to width, depth, and slope. That portion of the channel in the lower valley has a capacity sufficient to safely carry off the water that may come from the entire drainage area. The small creeks high up on the divide are taken into account in adjusting that capacity. Where one part of a river system joins another part the channel below the junction of the two streams is of the right size to carry the waters of both. There is harmony and unity and an undeviating fitness of all things in the basin.

Supposing, now, it should occur that the upper part of the basin did not harmonize with the lower part? Supposing, for example, that the upper part were well drained and the lower part poorly drained—what would occur? A proper answer to this question is furnished by the great Mississippi Valley itself. Much of its upper portion is well drained, while its lower part is a flat delta region. The result is a great overflowed and swampy country from Cape Girardeau to the Gulf. Look at the Kankakee basin over in Indiana. Just being awakened after the sleep of centuries. Look at that enormous wheat area in the valley of the Red River of the North, and that vast rich bottom of the Tombigbee in Mississippi and Alabama. These are the very conditions that we are trying to correct by artificial drainage. Yet, in many of our drainage schemes we are endeavoring to perpetuate the very procedure which in nature resulted in swamp conditions.

In numerous places we are draining the upper portions of swamps without providing suitable outlets for water in the lower portions. This process not only makes the drainage works less effectual than they would otherwise be, but it also accentuates the swamp conditions in the lands below.

THE PROBLEM OF DRAINAGE

Artificial drainage creates new conditions. In its natural state a swamp gives up its water slowly. If that were not so, the land would not be swamp land. The rivers draining that swamp are accustomed to receive the water only at the rate at which the swamp gives it up, therefore those rivers have through long ages become habituated to receive water at that rate and at no greater rate. Therefore, when we drain wet land, it can not be sufficient to dig ditches through a great area and discharge the water into streams that are not adapted to that increased rate of flow. In rational drainage it is necessary to consider the whole basin—the hill land as well as the low land, and the drainage system must be fashioned with due regard for every part. The necessities differ in no essential degree from those of a sewerage system of any city. No one would think of building the upper end of the system without regard to the lower end, nor of dividing the problem up into districts to conform, for example with city ward lines, and constructing each without regard to the other. In laying out a city sewerage system we must at the outset design each portion, from outlet to highest point, so that when the whole is eventually completed it will become an harmonious drainage work. The same plan is demanded in swamp drainage. Whether the swamp be one mile or one thousand miles long, it must, if included within a single river system, eventually be reclaimed as a unit. Of course this does not apply to coastal marshes like those of Louisiana, where the logical process is to dike off lands and to pump the surplus water into canals that discharge directly into the ocean. It applies, however, to by far the greater area of our swamps, where the reclamation must be accomplished by gravity drainage into natural streams already established. In such cases those natural streams must be enlarged and adjusted as far down their courses as is necessary, and even at times to their ultimate reaches.

That is the way Nature drains—that is the way we must do it. The laws governing drainage differ widely from those governing irrigation. In the latter we must decide how much land can be irrigated with a certain amount of water. We can conduct the water on the land we designate and can leave neighboring lands out of consideration if we choose to do so. This can not be done in drainage work. In a swamp the water is already there. We take it out by digging gravity canals and lowering the water table. We can not define offhand the extent of land that is to be benefited by that canal. The extent of the benefit depends on natural soil conditions, and the influence exerted by a drainage canal may be narrow or it may be wide. If a drainage district, for example, recognizing that it must provide a suitable outlet for the surplus water that it discharges from the district, enlarges the natural channel or digs a new one beyond the district boundaries far down to a remote point at which a suitable outlet is provided, that channel will benefit by

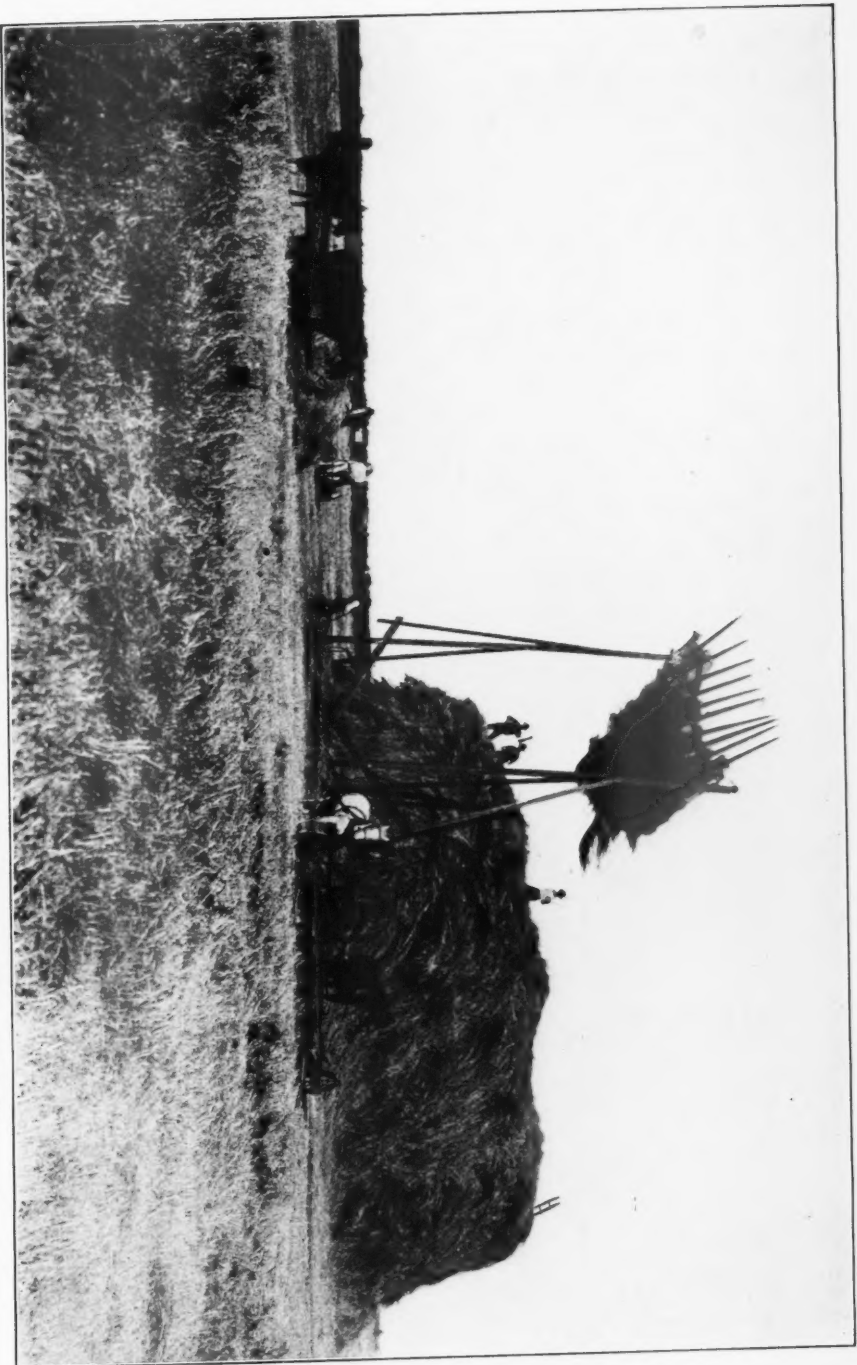
drainage all the country that it passes through, whether the district authorities like the result or not. Such a benefit to the lower region must be paid for by the people of the district. In other words, they must be assessed for benefits to lands in which they have no immediate interest.

We might illustrate a score or more of conditions of similar purport, all of which prove substantially that logically, ethically, and financially, the drainage of a swamp should comprise all the lands in a particular basin. There should be participation in the expense by every land owner, or there will be an inequitable distribution of expense. Is it not evident, then, that drainage is a big affair, to be planned and executed on a broad basis and to be financed in a way that will ensure success? Drainage is no "peanut-stand" proposition, and it is just as absurd, just as foolish, to try to divide a great swamp up into unrelated districts as it would be to divide a great trunk railway system into a collection of unrelated county or municipal units. But up to the present time our drainage work has largely been on a "peanut-stand" basis and many of the propositions for future development are conceived with no more breadth of view.

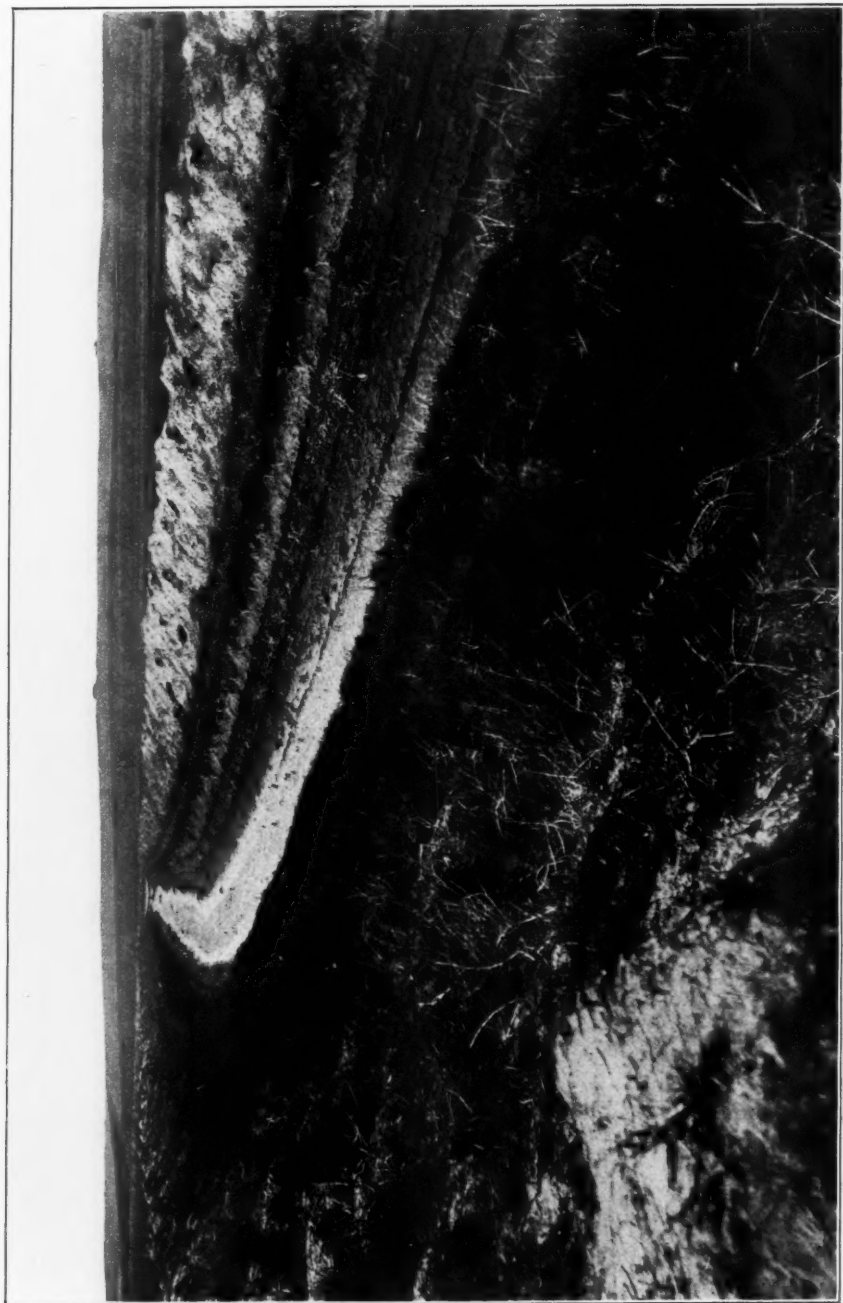
There is only one drainage project from Cape Girardeau to the Gulf; only one in the valley of the Red River of the North; one in the Tombigbee valley; one on the Apalachicola; one on the Kankakee of Indiana; and one on the Suwannee of Florida. I know that good men say that such a conception is too large and impracticable, but I am persuaded that this can not be true. It is my opinion that the problems involved in the drainage of all the swamp lands in the United States combined do not encounter the real difficulties and the untried engineering questions that are comprised in the construction of the Catskill water-supply tunnel of New York, or the installation of the new water supply of the city of Los Angeles.

THE SCOPE OF A DRAINAGE SYSTEM

I have suggested in a brief and incomplete way that which seems to me to be the necessary scope of a drainage system, and have tried to show that there are certain immutable laws of nature that must govern every drainage operation. Of course it is not intended to imply that every drainage scheme must at the outset provide for the immediate reclamation of every part of a swamp area, however great. That which is insisted upon without any reservation whatsoever is, that no drainage scheme should be carried forward without study of the entire basin within which lies the part immediately to be drained, and that every piece of work done, both interior and exterior, must be fashioned with due regard for the necessities of every other part of the basin. While it may be necessary or expedient in certain cases to drain lands by reclamation in small progressive units, the tendency should ever be toward the larger and more comprehensive work, bearing in mind that the end for which every one should strive is the inclusion of all swamp lands within any river basin. In one region at least, of which I have personal knowledge, the people, having started out on a broad and comprehensive basis, are now inclined to divide up the original area into several independent districts. That is real retrogression, and I can conceive of no greater drainage folly.



STACKING ALFALFA ON RECLAIMED SWAMPLANDS OF SACRAMENTO VALLEY, CALIFORNIA.



DITCH DRAINING GOOSE LAKE IN CARROLL COUNTY, IOWA.

In the light of the foregoing conception of drainage let us look at some of our swamps. Beginning with the most famous, the Dismal Swamp. We find that it occupies parts of Virginia and North Carolina. A little farther south, there are those areas lying on both sides of the North and South Carolina State lines. The northern part naturally drains to the southern part. The Savannah River on the northern border, and the Apalachicola on the southwestern border of Georgia, have great swamp and overflow areas in South Carolina, Alabama, and Florida. In southern Georgia, too, there are the Okefinokee swamps which, if drained, must have their outlets across the State of Florida. The Tombigbee Valley in Mississippi lies above the same valley in Alabama. The Pearl River bottoms occupy parts of Mississippi and Louisiana. The St. Francis basin lies in Missouri and Arkansas; while the swamp areas of the Red River of the North occupy Minnesota and North Dakota. Instances like this could be multiplied greatly. Wherever we look we find swamp conditions that cover land in two or more contiguous states. In other words, the greater part of our swamp drainage problems are interstate.

INTERSTATE PROBLEM OF DRAINAGE

What are state boundaries? They are lines established by man to mark off separate legal jurisdictions. They are placed where they are by virtue of conquest, discovery, agreement, or otherwise. Except when they occupy the crest of a drainage divide, they do not conform to any natural division, and natural problems and necessities are in no wise changed when state lines cross any particular basin or swamp. The natural laws governing the drainage of swamps were established long centuries before such things as state lines were conceived by man. Can it be believed that the drainage necessities in the St. Francis basin, for example, are altered in the slightest degree by the fact that the people have thrown the Arkansas-Missouri boundary across this basin? Of course such an assumption is preposterous. And yet, on the two sides of that boundary line there are separate jurisdictions, different laws and processes, and there is not even a remote probability that under present conditions there can be any unity of action on the two sides to comply with the unalterable nature requirements. Missourians, with commendable enterprise, have drained large areas of their land. The people of Arkansas must tax themselves to take care of that surplus water. When they reclaim their portion of the St. Francis basin, a part of their cost will be for the proper disposal of the water which the people of Missouri have thrown down upon them. Is it not clear that the logical and the just way to have handled the St. Francis problem would have been to drain that basin as a unit, each owner, without respect to local jurisdiction, paying his share of the whole system cost?

When we assess benefits for a city sewerage system we do not charge the owner of land located near the outlet a larger price than the one located at the head of the system, merely because the sewer in the street adjoining the lower land is larger and laid deeper than that serving the upper lands. We assess the owner at the upper end for his proportionate share of the cost

of that large outlet sewer. The principle is precisely the same in the St. Francis problem—and so it is in all other interstate swamps.

How can the matter be adjusted under two separate jurisdictions? Some one may say that the States can unite for the common purpose and to carry out the work under mutual agreement. Possibly this may be done; but we have yet to see a successful example of it. There are many who believe, as a result of observation of interstate matters, that the logical and wise way and the only surely successful one is the intervention of a common authority. And what is the established common authority as between states in this country? It is the Federal Government.

I believe most thoroughly in providing every orderly safeguard that may be necessary to preserve the integrity of local government. There can be no virtue in any proposition that would needlessly deprive any locality or any State of its prerogatives and transfer them to the nation. On the other hand, it appears to be a matter of simple logic and plain common sense that where the established requirements of an artificially divided jurisdiction in any place are inevitably opposed to the fundamental laws of nature that require common jurisdiction in that place, the requirements of the former must give way to the necessities of the latter in so far as may be necessary to accomplish the ultimate purpose. The simple fact is that we have in the drainage of interstate swamps a condition into which our much revered governmental precedents will not fit. We are confronting a new problem which requires the adjustment of our governmental ideas. It is a testimonial of our progress and an indication of our economic needs that we are so confronted, and it is inconceivable that the American people will fail to adjust themselves to any condition that forces itself upon them as a result of their enterprise and foresight.

FEDERAL CONTROL IS NECESSARY

But the national aspects of swamp reclamation are not confined to those of engineering necessities. Other aspects of economic necessity are truly Federal in fact, if not in law. Moreover, these aspects are by no means confined to interstate swamps. Seventy-four million acres of swamp land lying in almost every State in the Union constitute of themselves a sufficiently important issue to make them a matter of general welfare.

First and foremost, our swamps are the greatest single menace that now remains to public health. This Republic has from its beginning and in common with the rest of the world been subject to an enormous drain by reason of disease. Men of science have pursued these diseases, and, by hazardous labor, have brought out of obscurity fact after fact concerning them and the means of their prevention. Some diseases have not yet been run to earth but others are fully exposed, and we are reaping the benefits of the information. Swamp lands harbor the agents by which at least two destructive diseases are spread abroad. Malaria and yellow fever are transmitted by the mosquito, and in no other way. Time at my disposal does not admit of a discussion of the mosquito agency in these two diseases and it will be suffi-



SMALL CYPRESS AND GROUP OF KNEES IN ST. FRANCIS RIVER, ARKANSAS.



LARGE STUMPS OF CYPRESS IN SLOUGH, ALSO THE KNEES, UNIONTOWN, KY.



CONVICTS WORKING IN DRAINAGE DITCH, HOLBECK'S SWAMP, NEAR
CHARLESTON, S. C.

cient to state that such an agency is an established fact. Malaria has always been a silent, but persistent scourge. Yellow fever has come repeatedly upon us, scattering terror like a horde of savages and leaving in its wake broken households, sorrowing communities, deserted markets, and financial loss. Malaria is still with us. Yellow fever will surely come again, and the pity of it is that we fail to use the means that have been placed in our hands to stamp it out forever. Is not this a Federal matter? Consider a moment. Yellow fever visited New Orleans in 1905. In the dire emergency of that time it was considered a wise and proper use of Federal authority to send national experts and Federal money there to conquer the epidemic. Would it not be wise and proper also for the Nation to prevent the evil as well? It is a wise statesman who responds to an emergency. It is a wiser one who foresees that emergency and makes ready for it.

Another national aspect of swamp drainage is that of home making. In their present condition the swamps of the country are a source of weakness in our national economy. They are now unproductive; they can be made sources of great national wealth. They are now practically vacant; they can be made to produce citizens. In other words, they can become the sustenance of the very element of which this country is made up. Seventy-four million acres of drained swamps can be made to support at least 7,000,000 people in agricultural pursuits. Is not this a national matter? Does it not enter into every element of production, trade, and finance? Does it not become an essential feature of national stability, national progress and national defense? And if all these matters are not truly Federal, why then has the Federal Government entered so largely into them in the past? The facts are that an issue so big and broad and inclusive as the reclamation of 74,000,000 acres of land must be a national matter, whether we would have it so or not.

I have not come here in advocacy of any particular measure. My whole function is to emphasize, as well as I may, the facts concerning a particular necessity. In the adjustment of State and Federal relations there is no necessary complication, no permanent relinquishment of State sovereignty is required, nor any permanent expansion of Federal authority. From a practical standpoint I can see no difficulty in securing constructive cooperation by all parties concerned. To reclaim these interstate swamps there is required a broader jurisdiction than is possessed by any one State and a more extensive credit than is possessed by any individual to whom settlement upon agricultural lands is attractive. There are many who will be opposed because the plan violates legal precedent, and many more will oppose it because of what they believe to be constitutional limitations. Whether or not there be any such limitations I am incompetent to determine, but as one who believes that government is the means and not the end, I am unable to see any insuperable obstacle. And when they who oppose rise up and cry "The Law" it appears as though the proper and comprehensive reply must be "The Necessity." In days like these one can hardly find himself justified in refusing to do a necessary thing because that thing was not foreseen by our forefathers.

SOME NOTES ON GERMAN FORESTRY

By WARREN H. MILLER, M. F.

EDITOR OF FIELD & STREAM.

IN the summer of 1911 it was my privilege to review on a large scale forestry studies undertaken twenty years ago in Saxony, and also to compare in a general way the practical forestry of Germany with that of France, to which I recently devoted the better part of two year's study. Starting with the countless kiefer or sylvester pine forests of North Germany, continuing through the mountain fir and spruce forests of Thuringia and Saxony, and ending with the oak and beech forests on the clayey soils of Rheinland and Westphalia, I saw over two hundred German forests, many by rail and not a few by leisurely inspection, on foot. For the trained forester, such a trip was of the keenest delight, and crowded with helpful hints and practical kinks adaptable to our own practice; and a brief description of the more salient points which came under my observation may be of interest to the fraternity of foresters here in America.

Without exception these German forests were all under full management and yielding paying dividends that enabled them to hold their own against surrounding agriculture, and among the conifers only three out of about 150 forests were by natural reproduction, by seeding cuts, as in France. All the rest were planted, the experience of the German foresters being that the uniformly straight trees resulting from planting gave a market for all sizes of thinnings which would otherwise be a source of embarrassment as it now is with us.

KIEFER (SYLVESTER PINE)

Probably the most interesting study of all was the growth and disposal of the immense forests of kiefer or sylvester pine which cover Prussia. From Hamburg to Berlin, dozens of these forests are passed, and in every direction from Berlin, westward as far as Magdeburg, eastward through Prussia to Ost-Preussen, and southwards well into Saxony, they number hundreds, from small tracts of forty or fifty acres up to areas of several thousand. The natural soil is all poor and sandy, scantily mixed with loam, and will grow only potatoes and cabbages, with a little pasturage, so that forestry pays almost as well as agriculture, ranking therefore as one of the principal industries. This immense sandy plain covers a large per cent of the total area of Germany, and the country seems to have grown up with the kiefer pine as a national institution, for the influence of this tree upon the life and architecture of the people is one of the most logical instances of cause and effect to be met with in observing the fundamental characteristics of a nation. To provide a market for the six-inch kiefer thinnings there is the typical

German peasant cottage, which our architects are wont to smile at as a crude but costly manifestation of peasant architecture, and a quaint instance of waste of good lumber. If we were to set out to build such a house we would floor it with 2x10 and 2x8 hemlock joist, frame it with 2x4 (sawed out of 2x12), stucco it, and then nail on outside a $\frac{7}{8}$ " dressed imitation, "beam" of expensive white pine so that it will not warp and expose the sham. The German, on the contrary, takes his six-inch kiefer thinnings, for which we would have no other market than cord wood, squares it four-sided to a 4x4 stick dressed on one side, and frames his cottage with this otherwise worthless forest product. Who then has built the most logical house; who has wasted the less of his forest growth, and who has put the least labor on his forest product to make it commercially valuable;—the German who plants and grows straight kiefer whose thinnings only require dressing, or the American who cuts down a wild sixteen-inch hemlock to rip it up into 2x4 studs?

The three, four, and five-inch thinnings are all used for cellulose. As I passed section after section of thinned three-inch twenty-year growth and noted the neat piles of three-foot sawed and barked poles, I thought that it was thrifty of them to get off the bark for tanning, but it made rather expensive cord wood of it. But later the mystery was solved in the immense cellulose works in south Germany, principally around Dresden and Pirna where millions of feet of these same short cord-wood piles were in evidence, representing a steady market for all the three, four and five-inch trees; with even a lot of six-inch, showing over-demand. These had all been brought up the Elbe by canal boats, from the kiefer forests neighboring the course of the river until it empties into the sea at Hamburg.

Much of the eight-inch goes to Westphalia for mine timbering, though a lot of it is sawn up for door and sash trim, which is almost exclusively of this wood. Around Duisburg, in the heart of the coal and iron districts along the Rhine and the Ruhr, you will see great yards of short eight-inch lengths of kiefer for mine tunnels, and much of it is sawn into short 2x8 slabs for roofing and sheathing the mine shafts. The ten, twelve, and fourteen-inch kiefer is sawn into board lumber, beams, and timbers. The bark is all used for some purpose I could not discover in the limited time available, possibly for tan. All the rough boards are shipped just as sawn without attempting to square the edges. As nothing in Europe is wasted they probably prefer to saw the tare and sell it on the spot for kindling in preference to leaving it in the forest as waste.

In noting the silvicultural handling I was surprised at two things;—the shortness of the revolution, and the close spacing of the initial planting. I never saw a forest of kiefer set out over thirty inches to one metre apart, and they are left on this spacing until about fifteen years old. They clear themselves nicely at this spacing, and the first thinning gives you a great quantity of straight three-inch poles about 20-ft. high. It takes about two-thirds of the stand, leaving the balance on five foot centers, which are again thinned to twelve foot centers fifteen years later. The entire revolution is not over sixty years, by which time the entire stand is of dominant twelve-inch and second-stage ten-inch trees, with here and there a more successful

one of fourteen inches. The taper is very slight, the twelve-inch diameter continuing up to about 25 ft. or well up onto the reddish part of the trunk, after which it suddenly tumbles in and branches to the crown limbs. Total height about forty feet, of which all but about twelve feet of crown is saw lumber. The branches of the crown, down to about an inch, are sold for firewood, and, if no faggot-gatherers are at hand, the rest is piled in rectangular piles, some six by ten feet by seventy feet high. I did not see any being burnt. They could easily shovel in sand layers in the pile and allow the whole to reduce itself to compost for planting operations. I did not have the opportunity to examine the interior of a pile, and, as it was not the planting season, nothing was being done with them.

METHOD OF PLANTING KIEFER

One of the objects of my tour was to see whether the method of planting of Baron Manteuffel, extensively used in Saxony during his administration as chief forester, had extended itself to Prussia and Hesse, or was being still used in Saxony. It consists essentially in surrounding the roots of each small plant with a little hill of compost, and covering this with a cone of sod, made of two crescents of turf lapping to a cone with the grass side in. It is a splendid, if costly method, as it surrounds the roots of the young plant with the nutritious vapors from the compost and the sod, engendered by the heat of the sun upon the outside of the cone. It was highly successful with spruce during the Baron's time, as it not only raised the young tree above the surrounding vegetation, but also kept it free from sogginess and cold.

However, I saw no kiefer planted that way. The invariable method was to plant in holes, with the root collet level with the prevailing soil, and compost around the roots. I saw no trees planted under three years old, and this seems a good thing when we reflect how subject to fungus diseases, such as *roussi*, pine is during its early years in the nursery. It is well to have it where it can be watched and guarded during the earliest years, and doubtless the expense of another year in the nursery more than offsets the extra cost of the Manteuffel method of planting for young plants which would otherwise be advisable in the field.

The majority of the cuttings were in long strips, a mile or so long by, say, four hundred feet wide; though one occasionally met square or irregular sections. As a rule the stumps were pulled and sold before replanting, though now and then you saw a section with the young trees missing, the stumps of the former stand. Virtually the only pine forest I saw with natural reproduction was a big tract of eight or nine hundred acres near Mannheim, which forest appeared to be all natural reproduction. Its newly regenerated sections contained a thick furr of young pines, with seed trees on about 200 feet centers still standing, but the trees on the 20 and 30-year stands were not nearly so straight as with the planted sections of the majority of the German kiefer forests.

The physical characteristics of kiefer are much the same as the sylvester pine of France. It will reach 70 to 80 feet high and 18 to 20 inches diameter if allowed an 80-year revolution; all the upper third of it has a sort of reddish-

orange ragged bark, giving it its American name of Red Pine; it has two needles only to the sheaf,—I never saw a sheaf of three needles, though I believe this is so of sylvester pine elsewhere. The lower bark is rugged, gray, with reddish edges. If shaved down to allow a ring of tar, such as is seen in whole forests of it where an insect epidemic is feared, the inner bark is the same reddish-orange as the bark further up. Like all sandy-soil species, it has an immense spread of shallow roots. The seeding cut, if natural reproduction, is very clear, seeders on 150 feet to 200-foot centers.

FIRE PROTECTION

All through East Prussia the railroad fire protection appears to be uniform and required by law wherever a forest abuts on a railroad. The right of way extends some 25 feet beyond the outer rails. Along its edge extends a shallow four-foot road of clean sand, sunken six inches below the soil level, and a similar road runs parallel to it thirty feet further back. These two trenches are joined by three-foot cross paths every ninety feet, forming rectangles along the railroad which are either kept entirely bare, only grass being allowed to grow, or else planted with white birch or locust, forming a tall border of hardwoods in which a falling cinder can do no harm. The forest abuts on the second path or road, while a third similar one with cross trenches can be discerned running along parallel inside the forest as a second line of defense, though this third trench is not universal. The arrangement is however obligatory, the only variation being in what kind of tree is planted in the protective rectangles. Occasionally they are used for vegetables or nursery beds, but the general favorite is locust. I tried to photograph some of these fire borders from the car window, but the negatives resulted in a blur, with shutter at 1/100 second.

Crossing over into Saxony, this protective border is replaced by an absolutely bare strip, 100 feet wide, running along the right of way, usually with its forest edge having a wagon road fifteen feet wide running along it and connecting with all the fire and logging lanes. In Hesse and Westphalia still another fire regulation is in force, there being twenty feet of clear grass along the right of way, next a 25-foot strip of birch or locust and finally a 12-foot road forming the edge of the forest. In all these types of fire borders the law was rigidly enforced of cleaning the younger trees and young sections of all lower limbs up to six feet from the ground, except in the case of very young sections, of course.

The fire lanes were spaced from 250 to 400 feet apart, of a width approximately the height of the trees in the section. In young plantations the ten-foot fire lane is quite common and thirty feet is usual with mature stands of kiefer and spruce in Saxony. Along the railroad these lanes are perpendicular to the road or nearly so, depending upon the lines of planting, to which they are always parallel. On hillsides they run up and down hill, notably in the big forests of 25-year spruce near Fulda, with 10-foot fire lanes every 250 feet.

SPRUCE AND FIR

Going from Prussia into Saxony, the character of the soil changes and

with it the forests. The kiefer becomes less frequent as more fertile and mountainous soils are encountered, and big spruce and fir stands with some hardwood become frequent. Near Breda, between Berlin and Dresden, I encountered the first stand of oak growing under sylvester pine, evidently the same method of reclamation of the heather (*Calluna Vulgaris*) moors into hardwood stands as in France. A little farther on, two miles from the town of Elm, is an interesting forest of fir, bordered with larch. This larch border, both for spruce and fir, I was to encounter very frequently thereafter. There is a considerable market for larch in Germany, and as it is a hardy, intolerant mountain tree over there, the best way to grow it is as a wide forty-foot border around a spruce or fir stand. The fresh yearly growths, yellow-green in September, of the twig-ends of European larch are catkins of needles five to seven inches long (the catkins, not the needles) which later divide up into the characteristic little tassels of ten or twelve needles sessile on the twig.

At Dresden I again revisited the forests of the Dresdener Haide and the Neiderwald in the Saxon Switzerland. Much young spruce is now being grown on kiefer soil in the Haide and seems to be coming along admirably. In the mountains both spruce and fir, properly thinned on selection forest methods, were reaching 16 inches diameter on 65-years growth, and were being logged on 70 and 80 year revolutions,—an encouraging advance over the usual 100-year revolution, and due entirely to judicious thinning. All regeneration was by planting, usually on the hole system, as I saw but one forest on the hillock system of Baron Manteuffel. The larch border is here a good deal in evidence. The photographs hereto of the forest operations in the mountains will give one a better idea of spruce and fir culture than any words of mine. In general, standard forest on slopes up to 45°; steeper than this, selection forest.

Leaving the Dresden district our route lay through Thuringia and into Hesse. After Leipsic this entire country becomes mountainous with spruce predominating,—the spruce which has made the Saxon foresters famous. The hills and plains were covered with it, always with the bare 100-foot strip along the railroad right of way characteristic of the Saxon fire protection regulations. The spacing at planting was almost as narrow as kiefer,—from one *metre* to four feet setting out, and left so up to fifteen years, by which time the lower reaches of the forest would be black with suppressed branches. As with young kiefer, all the eight to fifteen-year growth was trimmed up to six feet from the ground of its dead cleaning branches for at least the first section back from the railroad. I saw no young spruce set out under three years old, and the forests held sections of every conceivable age up to the end of the revolution, which was about 70 years. All the first thinning spruce finds its way to the wood pulp industries, in which this part of Germany abounds, being in a measure the chemical center of Germany. The four-inch stuff of the 25-year thinnings is used in a large measure for scaffolding poles in building construction, the poles being lashed with rope and taken down after the mason work, stucco, etc., is finished on the building. This method of scaffolding is also becoming quite common with our own contractors,



HERTOGENWALD IN BELGIUM. THE FOREST RESTORED.
SPRUCE WOODS ARE BETTER THAN WASTE.



BEACH WOODS IN BELGIUM.

replacing in a large measure the old expensive style of using hemlock stud-ding. It is universal in building construction in Germany. A large quantity of this small spruce goes for the masts and spars of the extensive inland water-way commerce of the Fatherland, as every old canal boat and lugger owns a collapsible mast of some kind, besides a full complement of poling spars. All the larger thinnings go for ship and derrick masts, trim, boards, beams and the like. The boards are shipped untrimmed, the log being peeled in the forest and sawn forthwith into planks which are shipped direct to the cities in canal boats without any edge trimming. One sees in Berlin, Frankfort, and the big industrial cities along the lower Rhine any quantity of such boards being unloaded from the canal boats. The planing mill has use for all their trimmings for kindling, etc., and the city can absorb such forest waste at a far greater profit than if trimmed before shipment.

THE HARDWOOD DISTRICTS

Approaching Frankfort, the clayey nature of the Rhinish soils begins to be manifest in hardwood stands, beginning with the big stand of pure oak with some spruce sections near Hanau. From here on mixed forests become the rule; not mixtures, but forests in which there will be a number of sections of oak, then spruce, then fir, then beech, etc. The hardwood regeneration is almost entirely by seeding cut, as in France,—I have no note of a single planted beech forest and only one of oak. The stands are uniform and the young sections thickly furred. There is of course not the necessity nor the natural inclination towards absolutely straight trees as with the conifers.

In the lower Rhine districts where marl and clays form the soil, the hardwood forests are very numerous, almost always with planted spruce sections included. The higher spots in Westphalia, however, are left in kiefer almost exclusively, probably from the scarcity of water as the soil is a good loam capable of growing oak. Between Cologne and Dusseldorf I noted a hardwood forest with a broad larch border of full-grown trees, showing that that method of raising larch is at least eighty years in use. I never read any great mention of it in German forest text books.

Near Duisburg is a characteristic mixed forest which I had the pleasure of examining on foot. First came a young oak stand of about thirty-five year trees, all natural regeneration and all somewhat crooked. Next a number of sections of hornbeam (characteristic of the north of France, not far from here); and then there was considerable high ground devoted to a dozen sections of kiefer, all planted. The soil was a rich sandy loam and the underlying strata of clay in the lower parts doubtless made the selection of oak and hornbeam logical.

About three kilometers beyond Duisburg is another of these mixed forests. First is about 200 acres of pure beech, a thirty-year stand; then beech mixed with larch, the latter doing well in spite of having such a poor neighbor as beech; then oak and spruce, the spruce being very poor, and finally forty acres of kiefer on sandy soil. A locust border and the forest logging lanes protected this forest where the railroad ran through it.

The further one gets towards Belgium the more clayey and richer the soil. Near Aix-la-Chapelle, about fifteen miles west of Cologne, is a fine stand of mature pure beech, then a small stand of spruce, and finally oak, all doing well on a clayey-sand soil, the spruce being planted. A short distance further on one passes a big planted spruce forest of 25-year trees abutting for half a mile on the railroad with ten and twenty-foot fire lanes perpendicular to the track every three-hundred feet. A bare open strip one hundred feet wide, protected this forest from the locomotive fires. Speaking of fire protection, I would like to note here that though this was near the end of one of the most severe drouths Germany has known, no rain having fallen for over nine weeks, I did not see a single forest fire except one down in the Bohemian Switzerland, beyond the Saxon border, where a big one was rolling acres of smoke up over the mountains near Tetschen-Bodenbach. But in all Germany, though one could see for twenty miles each side of the track, not a forest fire was in evidence. There was plenty of grass burns in the protective strips, but the lanes and trenches seemed to have automatically stopped them from getting into the forests.

IN BELGIUM

Just outside of Aix-la-Chapelle there are large spruce and oak forests, and shortly beyond you cross the border at Veviers into Belgium and practical forestry ends as suddenly as if one were transported to America. The usual wild neglected forest, so familiar along the right of way at home began to appear. Trees of all sizes and shapes and species rambled along together, mostly crooked and worthless commercially, and giving no sort of yield sylviculturally. About fifteen thousand feet to the acre would be about the value of the cutting, whereas the German forests I had just passed would run nearer sixty thousand, and ninety thousand is not at all uncommon.

During the whole of seven hundred miles of travel in Germany, never did I see a single tract of woodland neglected or one that was allowed to exist without yielding up a revenue up to the full bearing power of the soil. I saw hundreds of examples of German forestry, with practically all the species represented except maritime pine;—the kiefer of the great sandy plains of Prussia, the spruce and fir of Saxony, and the hardwoods of the Rhine, but never a single acre of wasted forest land. And the fact that much of it was on the railroad, with each its siding for swift and cheap transportation spoke well for a quick and profitable market, with but little expense intervening between the ripe tree and the lumber mill. It was easy to realize how Germany, with a total forest area of only thirty-five million acres, gets an annual yield of four-and-a-half billion board feet, and no less remarkable, to my mind, is the adaption of house building practice and of the industries of Germany to the needs of its forestry so that nothing is wasted. It would seem that, in the course of centuries of tree crops, the foresters and the architects had gotten together to agree on the best way to use *all* the wood that is grown on the soil.



BELGIUM, THE DENSEST POPULATED COUNTRY IN EUROPE,
CAN AFFORD WOODS.

FORÊT DE SOIDNES.



CLEARING OF WINDFALLS AND COLLECTING FIGURES FOR GROWTH STUDY BY STUDENTS OF THE UNIVERSITY OF MAINE.

DEPARTMENT OF FORESTRY, UNIVERSITY OF MAINE

By JOHN M. BRISCOE.

THE Department of Forestry at the University of Maine was established in 1903 and is the oldest undergraduate school of forestry in continuous existence in the United States. In the State of Maine, where the lumber and pulp interests are so great, the need of such a department was early recognized. The object of the department is to promote forestry throughout the State, and to provide a body of men suitably trained for the intelligent handling of forests, and also to serve as a preparatory school for those who intend to make forestry their profession.

Besides extension work and the general propagation of information on forestry subjects throughout the State the department strives to reach two classes of students:

1. Agricultural students who must have some knowledge of forestry for the conservative handling of their wood lots; and
2. Students who intend to make forestry their profession.

For the first a 36-hour course of lectures on general forestry is given in the spring semester each year. This course is required of agricultural students and it may be supplemented by electing any other forestry course for which the student has had sufficient preparation.

For the second a complete curriculum for the entire four years has been arranged and is required of all students majoring in forestry.

THE EQUIPMENT

The forest is the largest and best laboratory. The main office, class rooms, drawing rooms, and other laboratories are located in Winslow Hall, the largest and most modern building on the campus. The ground plan of this building measures 63 feet by 100 feet, and it contains over 40 rooms. It is built of brick, concrete and slate, of Tudor style of architecture, and has four floors including a well lighted basement in which the department has a large wood storage room and lockers. On the second floor are the offices and lecture rooms of the department. The third floor is occupied by a large lecture room and two drawing rooms separated from the larger room by folding doors, so that the three rooms can be thrown into a large auditorium at any time.

The interior finish and furniture are in a dark stain, and the building is equipped with electric light, elevator, hot and cold water, gas, and high pressure steam for laboratory work. Besides the laboratories and lecture rooms, in the basement there is a dark room for photographic work as well as lavatories and shower baths.

The department has a large electrical stereopticon and reflectroscope which is frequently used to illustrate the lectures, and there is a large supply of lantern slides and photographs illustrating every phase of forestry work. The equipment of forestry instruments of both American and German make is very complete. Most of this equipment is entirely new, and all is of the best quality obtainable. It is provided and added to yearly by the State as the necessity arises.

A forest nursery has been started in connected with the department, and young forest trees are grown for the purpose of experimental planting.

THE CURRICULUM

A complete undergraduate curriculum is arranged which will serve as the basis not only of practical work in forestry, but also of a liberal education. During the first two years much attention is given to biology and civil engineering, both of which are very important fundamentals upon which are built the more technical forestry courses. A knowledge of the principles of forestry in its different branches is given to the student, and considerable practical work is done in the forest. The woodlands belonging to the university, together with adjacent lands covered by young forest, furnish a field for the study of many forest problems. Field trips are made and demonstration thinnings and plantations made at various places throughout the State. Particular attention is given to the collection and presentation of statistical data in report form.

Detailed descriptions of the courses as well as of scholarships and prizes offered by the university may be found in a special catalog of the Forestry Department which will be mailed to any one upon request.

The instruction in this department consists of lectures, recitations, laboratory and field work, the latter consuming a considerable portion of the scheduled time during the Junior and Senior years. The instruction in technical forestry subjects is given by the professor in charge of the department, and a field assistant. This is supplemented by work given in other departments under fifteen different professors and their assistants. Five recitations hours a week of successful work for one semester entitle a student to one credit. The minimum is seventeen hours a week (exclusive of physical training and military science), leading to three and two-fifths credits. A total of thirty credits or 150 semester hours is required for graduation. At graduation the student receives the degree of Bachelor of Science in Forestry.

Students who complete the curriculum are admitted to advanced standing in the graduate schools of forestry and are thus able to shorten the time required to obtain a Master's degree. Graduates are, however, prepared to go directly into practical work, and up to the present time there has been no difficulty in placing them in permanent positions.

There are good openings for students to obtain work in the maine woods during the summer vacations, and many take advantage of the opportunity to get practical experience, and at the same time aid in defraying the expense of their university course.

There are now 44 students majoring in forestry, beside some 50 others

taking one or more courses in the Forestry Department. Graduates of the school are in the employ of the United States Forest Service, and in charge of important State and private forestry work. Some of these are already employing students during the summer vacation and assisting them in securing permanent positions after graduation.

OBJECT OF THE CURRICULUM

The object is to give the student the best possible preparation for his future work, either in actual forest management or in the further pursuit of the subject at one of the graduate schools of forestry.

The forestry curriculum is not an easy one, and is suitable only for students who have good health and a strong constitution and are moreover able and willing to stand considerable physical as well as mental exertion. It is meant to prepare men for the requirements of the actual work that they will have to do after they have completed their college education, and it is by no means a sanitarium for those who simply desire to lead an out door life.

Owing to the fact that the timber was stripped from the mountains in its vicinity in so reckless a manner that there is now nothing but a spare second growth, a large powder plant of the Dupont Company at Wapwallopen, Pennsylvania, will be abandoned January 1st, the stripping the timber from the mountains having decreased the water supply so greatly that it is of no further practical service.

Mr. Albert Lewis, one of the lumber kings of the northeastern section of Pennsylvania, has spent over \$100,000 in building beautiful roads through his large lumber tracts in the vicinity of Bear Creek, Pennsylvania.

Title to about 5,000,000 feet of hemlock and hardwood in the vicinity of Warren, Pennsylvania, has been secured by the Poverty Lumber Company, and in addition is included enough timber to make about 5,000 ties. The timber tract embraces three hundred acres and is located at Brown Run.

Mr. S. T. Starrett, of California, has been appointed to fill the new office of Marketing Superintendent for the Hawaiian Territory. Mr. Starrett has made a preliminary trip over a considerable portion of the territory and in his report has made a number of valuable suggestions.

The experiment station at Wagon Wheel Gap, Colorado, established for the purpose of making an exhaustive study of the effect of forests upon climate and streamflow, is now upon a firm basis and a series of experiments has been made during the last eight months.

"It is generally thought that timber is fast disappearing from the hills and valleys of West Virginia, and in a sense this is true; but there is still plenty of timber in the state," says Charles L. McSade, of Greenbrier County, West Virginia. "West Virginia now has laws protecting timber and if the laws are enforced it will be many years before the lands are shorn of their valuable forests."

THE PRAIRIE DOG MUST GO

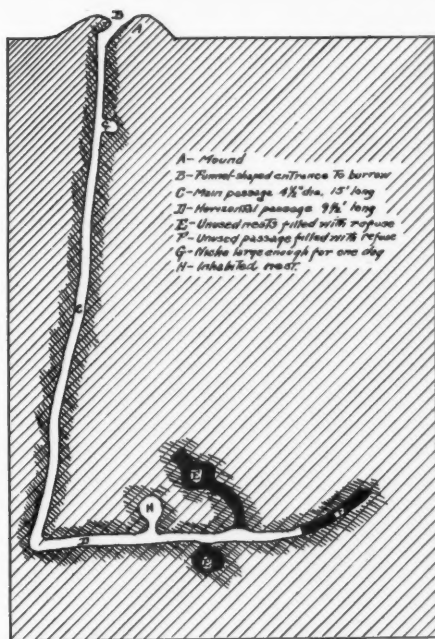
By ROBERT E. CLARK,

DEPUTY SUPERVISOR, LEADVILLE NATIONAL FOREST.

TO make the earth habitable for himself, man, throughout history, has been compelled to wage war on other animals whose existence has run counter to his interests. Always he has killed off or driven out the beasts that have interfered with him or his property. The rattlesnake and the wolf are now unknown in many parts of the country, though the typhoid fly and the familiar but consuming mouse still abound. From the saber-tooth tiger of primitive times to the plague-infested rat or the destructive San Jose scale, the fight has gone on. Had the killing been confined to such as these, the record would be better, for man has exterminated many kinds of animals which are not only harmless but useful. Just now he is after a most interesting little animal, but one that is doing immeasurable harm throughout the cattle and sheep ranges of the West.

Since prairie dog and white man were first introduced to one another, each has doubtless considered the other an undesirable citizen. With the entrance of the pioneers came the loss of horses and cattle through broken legs as the result of stepping into prairie dog holes. Also man himself often suffered broken bones as a result of being thrown from a horse which had the misfortune to step into a dog burrow. Then came the stock-raising industry, and the sufferings and losses experienced by this industry has made it evident that an infestation of prairie dogs on any portion of the range is a decided hindrance to perfect handling of stock.

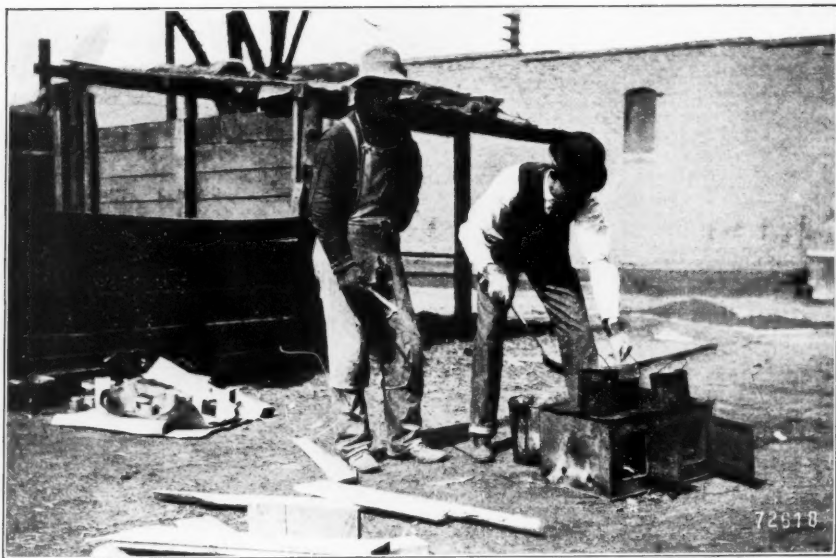
Not only do the owners suffer direct loss from the necessity of shooting stock that have broken limbs, but yearly they suffer a considerable loss due to cattle being light in weight. Cattle fall off in weight either from lack of feed or from being required to move about considerably to find the feed. Every prairie dog hole or town on the range causes a considerable area to become bare of grass or other forage, and it is but a few years after the dogs come in before large tracts are worthless to stock. The feeding capacity of the range is reduced not only by the area included in the dog towns, but also for a considerable distance surrounding these tracts, for their feeding grounds must be included in the range that the dogs destroy. Like other rodents, they have increased with the advent of man. The rapid increase in their number has become so pronounced that steps have been taken by the Biological Survey of the Department of Agriculture, by the Forest Service, and by private individuals to accomplish their extermination.



PLAN OF THE BURROW OF A
 PRAIRIE DOG.



SCATTERING THE POISON FOR PRAIRIE DOGS ON A BADLY DEVASTATED AREA,
 WHERE ALL THE FORAGE HAS BEEN DESTROYED.



COOKING POISON TO POISON GRAIN FOR EXTERMINATION OF PRAIRIE DOGS.



DRYING THE POISONED GRAIN.

These animals are gregarious and, through a dislike of solitude or a desire for protection, live in "prairie dog towns." These towns look not unlike a group of miniature volcanoes, of which the mouth of each burrow closely resembles the crater. The mound of closely packed earth serves two purposes; it prevents water from running into the burrow, and at the same time furnishes a lookout station for the occupant. As one approaches a town he will observe, while still some distance away, a number of little upright figures, erect and motionless as statues, on top of several of these little mounds. Upon close approach these figures emit a series of sharp cries and, with a flip of their tails, disappear like a flash. These are the sentinel dogs stationed on the outskirts of the town. As soon as the warning is given, there follows a rapid scurrying of the other inhabitants and a like disappearance into the ground. One marvels at the quickness of the whole performance. When a number of these sentinel dogs are in such a position as to be silhouetted against the sky, their upright position, warning cry, and rapid disappearance remind one of the stationary animal target, the shot, and the drop of the target familiar in shooting galleries.

THE HABITS OF THE DOGS

The prairie dog is herbivorous and roams about at a short distance from the burrow, feeding on grass blades and stems. Their drinking water is thought by some people to be obtained from their burrows, or, in other words, the theory has been repeatedly advanced that these little fellows burrow down to water. This is incredible; Dr. C. Hart Merriam points out that in some regions where these animals live the nearest veins of water are 1,000 feet below the surface. Presumably they can live without drinking, or at least with no more water than is afforded by the vegetation itself, or by the dews upon it.

Little is commonly known about the underground plans of their burrows, since it is almost impossible to unearth them without damage. This has been done, however, notably by Mr. W. H. Osgood of the Biological Survey, and the diagrammatic illustration gives a good idea of the construction. The mound at the entrance is conical in shape, and almost invariably compact in its formation. As the construction of a new burrow advances, the fresh earth which is excavated is gradually shaped and packed into this hard conical mass by the builders, using their noses as tamping bars and shovels. Packed as it is, it resists erosion by rain and wind. The burrows may be as much as 15 feet deep, though the average depth is nearer 8 or 10 feet.

The indications are that prairie dogs have but one litter in a season, with from three to eight young born at a time. This accounts for the spreading out of their towns, as new families set up for themselves.

They are extremely interesting little animals and very "cute," even to those who are familiar with the harm they do. It is true, too, that their little "chirp-chirp" lessens the monotony of the prairie to the lone traveler, but these redeeming points are not sufficient to make a balance in their favor, or to prevent urgent efforts for their extermination.

METHODS OF EXTERMINATION

The United States Biological Survey has for several years past tried various methods of exterminating the prairie dog. It has decided that the most effective and economical methods to employ are poisoning with barley roots soaked in strychnine, and suffocating through the introduction of bisulphide of carbon into the burrows. About one-half teaspoonful of the poisoned bait scattered on the hard ground at the mouth of a burrow is sufficient. When the bisulphide of carbon is used it is placed upon some absorptive material and thrust as far into the burrow as possible and then the entrance of the burrow is closed. If the bulk of the animals are destroyed by poisoning with strychnine in spring or winter when food is scarce, and the remaining animals subsequently treated with bisulphide of carbon, whole towns can be destroyed at a cost of not more than 16 or 17 cents per acre, probably less. Other baits that may be used are green alfalfa, green stems of young wheat or barley, and green corn stalks.

Besides the extensive efforts of the Biological Survey, the prairie dogs are fought by the Forest Service. Large areas of natural cattle range are within National Forests, and every effort is being made to put these ranges in perfect condition; hence efforts are made to get rid of both prairie dogs and predatory animals. Some persons believe that the decrease in the number of wolves and coyotes has caused an increase in the number of prairie dogs, a nice balance of nature having been destroyed. It is true that the most inveterate enemies of the prairie dog are the wolf, the coyote, the badger, and the rattlesnake. This list would make one want to take the side of the prairie dog if one could choose between him and his enemies. But the prairie dog is always the eaten, never the eater.

Not much has been done as yet; there is not money enough to pay for the material and labor required. However, the work of locating the towns is complete, and this is one of the most important steps in the work. Such work as the Forest Service has been able to do has been slow but sure. The poisoned grain method has been used almost invariably.

Following is the formula perfected and recommended by the Biological Survey:

STARCH-STRYCHNINE FORMULA FOR COATING GRAIN

Barley, clean grain, free from other seeds.....	20 quarts
Strychnia sulphate (ground or powdered).....	1 ounce
Saccharine	1 teaspoonful
Gloss starch (ordinary laundry starch).....	1/2 teaspoonful
Water	1 1/2 pints

Dissolve the starch in a little cold water and add 1 1/2 pints of boiling water, making a rather thick solution. While hot, stir in the strychnine and mix until free from lumps; then add the saccharine and beat thoroughly. Now pour the poisoned starch over the barley and stir rapidly until the poison is evenly distributed; then allow the grain to dry. When dry it will keep indefinitely without deterioration.

For ordinary quantities a galvanized-iron washtub is an excellent re-

ceptacle in which to mix the grain with the poisoned starch; but when large quantities are needed the mixing may be done in a water trough with a shovel and hoe.

DISTRIBUTING THE POISONED GRAIN

In distributing the grain each man has a sack slung over his shoulder and walks across country, covering a strip about 75 feet wide, and putting about $\frac{1}{2}$ teaspoonful of the grain at each hole. The bait is placed about 18 inches from the mouth of the burrow, as experience has shown that if the grain be placed in or down the hole it is either trampled underfoot or thrown out. At times it can be distributed from the back of a horse, but where the holes are close together this method has proved to be unsatisfactory. The distribution takes place just as early in the spring as weather conditions will permit. The dogs are then hungry and will eat almost anything. As soon as the green grass comes, they are not so likely to eat the bait. Clear weather is desirable, as repeated rains or snows will tend to leach out the poison. One bushel of grain makes approximately 4,000 baits, and one man can easily distribute 6,000 baits, or $1\frac{1}{2}$ bushels, a day.

After the poisoning, one does not see all the dead dogs about, and at first the work is likely to be thought a comparative failure. This is not the case, however, for in some instances the dogs back into their burrows and die underground. Examination of the treated areas also proves that few, if any, birds are killed by the poison. Sometimes coyotes and foxes have devoured the carcasses. This results in an indirect poisoning, but that is no great loss. Shooting prairie dogs has never resulted in any marked success, as one can not approach within reasonable shooting distance, and since they usually fall back into their holes when shot one can not be sure of the success of his aim. Drowning out has been tried, but it is too slow a process.

Though the work is slow, continued operations will tell in time. The Forest Service has treated only areas within the National Forests. Now, however, the Biological Survey is to take up the work both within and without the Forests. Cooperation with stockraisers is the next step, and the people who use the range see the importance of the work and are aiding it as much as possible.

Manufacturers, foresters, scientists and timber holders will be interested in the announcement that the St. Louis Lumberman has just issued in pamphlet form two important papers on the Utilization of Wood Waste by Walter B. Harper, M.S., and Prof. G. B. Frankforter, of the School of Chemistry of the University of Minnesota.

A description of the chestnut blight with blanks to be filled in giving information as to the presence or absence of the disease has been sent to all parts of the state by the New York State Conservation Department. In this way a very satisfactory and helpful location map has been prepared.

The School of Forestry of Washington has added a course in logging engineering this year. It is practically planned to meet the needs of men preparing for careers as lumbermen.

IRRIGATION IN TURKESTAN

By A. P. DAVIS,

CHIEF ENGINEER, UNITED STATES RECLAMATION SERVICE.

WESTERN Turkestan is a portion of the Russian Empire and comprises the southwestern part of Asiatic Russia. Within its limits are the provinces of Sir Daria, Ferghana, Samarkand and Trans Caspia. These are Russian provinces entirely under the jurisdiction of the Empire. They have a total area of 1,680,000 square miles, and a population of about 9,000,000. The same general area also includes the provinces of Khiva and Bokhara, which are nominally independent principalities, but are under the protection of Russia.

Nearly all of the drainage of Turkestan is into the Aral Sea, a body of water about 200 miles long and 150 miles wide. It is only about 60 feet above sea level. The eastern and southern portions of Turkestan are traversed by lofty mountain ranges, upon which the precipitation is very great, and is mostly in the form of snow. These mountains are drained by numerous streams, most of which lose their waters in the great sandy deserts of Central Turkestan, but the largest two of which reach the Aral Sea.

Most of the streams are used more or less for irrigation, the total irrigated area in Turkestan being nearly 6,000,000 acres, of which over one-third or 2,000,000 acres is in Ferghana Province, and 3,000,000 are irrigated in Samarkand and Sir Daria Provinces, and the rest scattered through the other provinces.

Russian Turkestan is a region of very great historic interest. It abounds in ruins of buildings, forts and irrigation systems, some of them prehistoric. The celebrated expedition of Alexander the Great, penetrated Turkestan as far as Khoghent, and ruins of fortresses built by his men may still be seen.

At a later date, the country was conquered by the renowned Jenghiz Kahn, whose descendants reigned over Turkestan for several centuries. One of them, Tamerlane, made his capital at the city of Samarkand, and built there magnificent palaces and temples of substantial character and great architectural beauty richly decorated with mosaic. The usual native architecture is of adobe, like that of New Mexico.

Turkestan was conquered and reconquered so many times and so many efforts to colonize it have been made, that its population is a complicated mixture of Europeans, Mongols, Persian, Turkomen and various other peoples. Agricultural and pastoral pursuits are their chief occupations, and their state of civilization is similar to that of Mexico and Central America. Plowing



Photo by A. P. Davis.

BRUSH PLANTED NEAR FAROB, TURKESTAN, TO PREVENT SAND DUNES FROM
DRIFTING ONTO RAILROAD.



Photo by A. P. Davis.

PACKING CAMELS AT BYRAMALI.

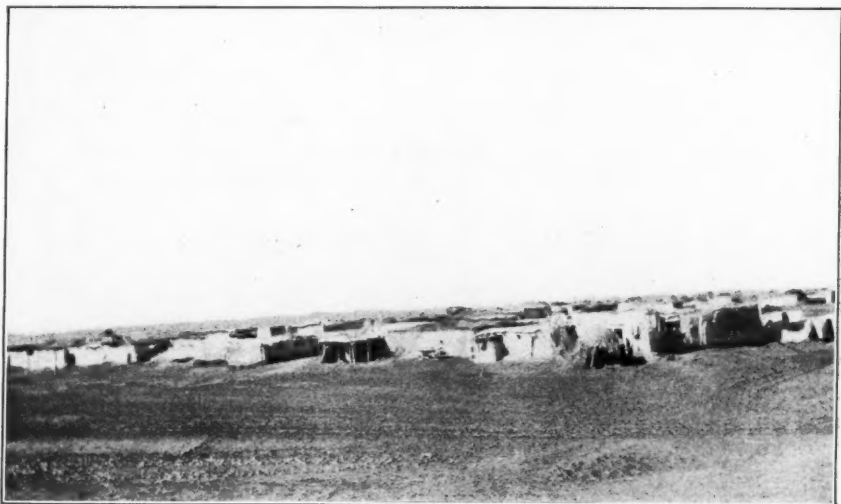


Photo by A. P. Davis.
VILLAGE OF GOLODNIA STEPPE, TURKESTAN.



Photo by A. P. Davis.
NURSERY OF DESERT PLANTS FOR TRANSPLANTING TO SAND DUNES TO KEEP
THEM FROM DRIFTING OVER RAILROAD.

is done with a forked stick shod with iron, drawn by oxen or horses. Camels are extensively used as beasts of burden, and the donkey is also much in evidence.

The climate is of the most pronounced continental type, very cold in winter and hot in summer. The precipitation in the valley regions is from 5 to 10 inches per annum, but in the lofty mountains is very great, and is mostly in the form of snow.

The largest river in Turkestan is the Amou Daria or Oxus, which rises in the high mountains of the Hindu-Kush and Kuen Lun. It is nearly 2,000 miles in length, 800 miles of which are the valley portions of the main stream from the junction of the Panj and Vach, its principal tributaries, to the Aral Sea. Innumerable small diversions for irrigation are made from this stream and its tributaries in the rude way characteristic of primitive peoples. There is still a very large unappropriated flow of water, but the small declivity of the river and the undesirable character of the land outside of its immediate valley have so far not attracted the investment of capital.

The valley of the Amou Daria for a width of over 60 miles is occupied mainly by sand dunes almost bare of vegetation and constantly shifting under the action of the wind which prevails from April to September, inclusive. In the winter months it blows more from other directions. It is said that twelve years ago trains passing through this region averaged less than two miles per hour on account of sand obstruction, and had to carry a crew of laborers to shovel sand off the track. During the last twelve years efforts have been made to cover a zone along the track with vegetation to break the force of the wind and hold the sand in place. An Experiment Station was established at Farob and in 1898 the propagation of native plants was begun. Seeds of the native desert shrubbery were planted in a nursery, where the sand was covered with brush and staked down to keep it from blowing away. The young shrubs were transplanted from the nursery to a zone one thousand feet wide on the west side of the railroad track and five hundred feet on the east side. About 15 to 20 per cent of the plants grew and spread by natural seeding. The vegetated area is now more than one thousand feet wide on each side of the track for a part of the distance, and great benefit has resulted. The work is still in progress.

The plant most successful for first use is *Alhalla Kamolorum*, which grows most easily and abundantly. After a good stand of this is obtained *Salsola* is introduced, which grows first as a parasite on others and finally crowds them out, growing larger and being thus more effective.

The most important and best constructed irrigation system in Turkestan is on the Estate of the Czar, on the Murgab River, with headquarters at the historic town of Byram Ali.

The first recorded irrigation construction in the Murgab Valley was under the authority of the Sultan Sanjar in the Twelfth Century, who built a dam about 60 miles above Byram Ali and irrigated over 50,000 acres. The location was at the very head of the Valley, where the sand dunes begin to encroach upon the river.

This ancient canal system was destroyed by Ghengis Kahn and the valley was consequently depopulated. It was rebuilt by a grandson of Tamerlane in the Fifteenth Century.

In 1799 the system as rebuilt was destroyed by the Emir of Bokhara, and the valley was again depopulated and reverted to desert.

After the conquest of Turkestan by the Russian Government, the valley was added to the Emperor's Estate and in the years 1887, 1888 and 1889, the dam at Sultan Bend was rebuilt for the Emperor by the engineer Kosel-Poklevsky, a Polish revolutionist, who had been banished to Siberia, served his term and came to Byram Ali. He made brick and hydraulic lime on the ground, of which he built the dam, upon a foundation of loess, which was recognized as unsuitable for a high dam.

To guard against accident, he built three dams so situated as each to stand one-third of the head. The lower two had no gates; the upper one had gates. All these dams were built in the dry, at one side of the river.

After their completion, a dam was built in the river channel of fascenes, earth and rock, and the water accumulated behind during the low water season. As it was *closed*, the bank was cut above the three dams to allow it to pass through the gates therein provided, but instead of doing so, it cut a new channel leaving the dams high and dry.

In 1895, an engineer named Andreyeff was employed by the Estate to build a dam at Hindu-Kush where a power plant is located, which uses for power the water that runs down the river to Merv, to satisfy prior rights. The power is transmitted to Byram Ali, and used for lighting and running the cotton machinery. The capacity of this reservoir is 10,000 acre feet. There are three valley reservoirs with a combined capacity of 23,000 acre feet.

The canal system from the Hindu-Kush Reservoir was built by Von-Valueff. The main canal was 17 miles in length and is called the Tzar Canal. It has a capacity of 500 cubic feet per second and irrigates 5,000 acres of cotton and 7,000 acres of wheat and barley.

In April and May, 1903, came great floods which filled the Hindu-Kush Reservoir with sediment.

In 1910, Von Valueff built the Sultan Bend and Yolatan Reservoir. These are 12 versts apart. Yolatan Reservoir holds 55,000 acre feet and backs water to Sultan Bend, which is located at the head of the valley, near the site of the original dam built by the Sultan Sanjar in the Twelfth Century.

Most of the structures are built of brick and are very heavy and substantial.

Sultan Bend Reservoir backs water 40 versts and has a capacity of 55,000 acre feet.

The total storage capacity on the Emperor's Estate is about 140,000 acre feet, but this will rapidly decrease with accretion of sediment.

Canal Sultan Yab leads from Sultan Bend Reservoir and is on the same location as the oldest known canal. It has a capacity of 800 cubic feet per second.

The total diversion capacity of the system is about 1,500 cubic feet per second, and serves about 60,000 acres of land.

Cotton, wheat and barley, alfalfa and fruit, are the chief products in the order named.

The next largest stream in Turkestan is the Sir Daria which is, in general, about half the size of the Amou Daria and has a minimum flow of more than 15,000 cubic feet per second. The Sir Daria and the Amou Daria are the only streams in Turkestan which reach the Aral Sea, the rest being lost in the desert or consumed in irrigation.

A large number of small canals have been diverted from the Sir Daria in Ferghana, Samarkand and Sir Daria Provinces. These are used for irrigating temperate zone crops, including grains and forage plants, some fruit trees, a large amount of cotton. A large canal taking water from this river was built as a private enterprise by the Russian Emperor, Nicholas I, which, taking advantage of a series of islands, diverted about 300 cubic feet of water per second into a canal with a length of about 28 miles on the river bottom, and an equal distance over the desert on the bench to the west of the river, all in the province of Samarkand. This system, however, was built on too flat a grade. Its diversion point is unfavorable and unreliable, and the entire canal is located on low ground in such way that it is difficult to carry the water to the fields to be irrigated. The ill success of this system has led to an enterprise on the part of the Russian Government to supersede the existing canal system by means of another heading further up the river and built on a heavier grade, which will command the same lands and a little more. This canal is now under construction and the main canals of the old system will be in the final plans used for drainage.

It appears to be feasible to divert the Sir Daria into a very large canal near the town of Khojend on the left bank and carry the same in a course practically westward to irrigate the vast plain known as the Golodnaya Steppe, where nearly a million acres of very fine land can be found, which is smooth, has an excellent soil, and slope favorable for irrigation. It is probable that the water supply is not sufficient to irrigate this entire tract, but this must depend upon complete adjudication of prior claims to the waters of the Sir Daria.

A PATRIARCH

By THOMAS NELSON PAGE.

DR. HUNTER McGUIRE once related to the writer that having performed an operation on the eyes of a boy, who had been born blind, and given him sight, he asked the lad what was the most beautiful thing in the world, and he answered instantly, "A tree."

This verdict will be endorsed by all except those who have not received their sight. And in their memory will generally stand forth prominent some one tree which excels all others of its kind. It may be some hoary cypress like those of Santa Cruz, bearing on its scarred trunk the marks of centuries; it may be a New England elm, lifting its head to the sunlight in perfect symmetry; it may be a live oak spreading afar its branches to the ground as though to seek with its leaves the moisture about its far-sent roots. Or it may be some mighty oak, towering above its fellows in stupendous majesty.

Such a tree I know. A white oak of vast proportions and imposing majesty. On an old Virginia plantation in Hanover County it stands out in a field, a patriarch of the forest, surrounded by its progeny—the offspring of its later years. Girdled by them like an ancient chieftain surrounded by his body-guard, it stands, one of the last relics of the primeval forests of Eastern Virginia, whose glory awed the first Anglo-Saxon settlers when they came to this virgin land.

The original survey of this land for William Nelson based on the King's Warrants is in the writer's possession, carrying so many acres of "King's land" in the "forks of Pamunkey;" lying between the Little River and the New-found River, and it has always since been in the possession of the family. From William Nelson the land with this tree, already noted, came down to Thomas Nelson, a signer of the Declaration of Independence, Revolutionary War Governor of Virginia, and Commander of Virginia's forces. Here he died at the age of forty-nine, and this oak once shaded the first stable-yard of the plantation. No trace of the stable remains; save this majestic monument which has survived several wars and many generations. One of his granddaughters, now ninety years old, remembers to have heard the oldest son of General Nelson, to whom this estate descended, say that he would never cut the tree down because his father admired it so. Thus the tree was in its prime several generations ago, and Totopotamoi children must have played beneath its sheltering arms. Today at a foot from the ground it is not less than eight feet in diameter, and cannot be less than five feet at any height below the branches. It must shade at least a third of an acre and beneath its boughs the cattle find their favorite refuge alike from the summer heat or the winter blasts.

In my youth the great tree stood alone in its majesty in an open field, a model of the genus from whose endurance came the term that since the buildings of Rome has stood for robust strength. The field when last cultivated was left, like so much of our Virginia land, in corn-beds and along through the '80s grew up in pines; but above this parvenue growth towered ever the "Big Oak" and when ten years ago the writer cleared the field again, he found that the old tree had surrounded itself with a numerous progeny. It stood in the midst of a dense thicket of young white-oaks ranged in lines along between the rows where the acorns had rolled and sprouted, those nearest the boll being spindling and weak, while those on the outer edge of the circle are vigorous and robust.

On the south side alone the oaks are supplanted largely by cedars, showing where the birds sought the comparative shelter of the south side of the tree and dropped the seed. Glancing down the rows little vistas lead to the great trunk but viewed from the side, the grove is impenetrable.

I have been advised by friends to thin out the grove about the old patriarch, but as he is lusty and robust, and has survived alike the crowding of his earlier generations and the solitariness of his later life, and as he has without aid from man reproduced for himself in his old age a hundred children, I shall let him alone to enjoy in his own way his glory, and to testify to succeeding generations the majestic grandeur of the Virginia oaks.



HIS MAJESTY, THE OLD OAK.



A CLOSER VIEW OF THE OLD OAK.

FIVE STATES UNITE TO SAVE FORESTS

ONE hundred and forty of the leading loggers, lumber manufacturers and forest conservation experts of Montana, Idaho, Oregon, Washington and California met at Portland, Oregon, early in December to attend the forest fire conference of the Western Forestry and Conservation Association. The best methods of forest fire protection, conservation of the forests and reforestation formed the central thought of the convention.

After two days devoted to hearing many excellent addresses and spirited and valuable discussions the convention adopted resolutions urging co-operation by Federal and State Governments and local forestry and conservation associations for the conservation of forests of the Pacific Coast and Pacific Northwest, through proper and adequate means of prevention of forest fires, and urging each forested county to contribute its share of the expense of fire patrol and fire fighting. Appreciation was also expressed of the Federal Forest Fire Service.

E. F. C. Van Dissel, of Spokane, G. M. Cornwall, of Portland, and F. G. Greggs, of Tacoma, were appointed members of a committee to take the matter of securing the use of troops for preventing and fighting forest fires up with the secretary of war, and if existing laws do not permit the head of the war department to comply with the request, then the committee is to undertake securing proper legislation to provide for this need.

The best means for regulating the destruction of debris and minimizing the danger from fire loss was discussed at length. J. L. Bridge, of the Washington Forest Fire Association, favored burning slashings in the fall instead of the spring, because of the ever-present danger that smoldering fires usually remain only to be fanned into a dangerous conflagration at the beginning of the dry season. He urged the necessity of assistance and co-operation between logging operators and timber owners to reduce fire risks.

W. D. Humiston, of the Potlatch Timber Protection Association, argued that it was best to burn slashings as the logging progressed whenever that course was practicable.

F. A. Elliott, State Forester of Oregon, agreed that local conditions determined in a large measure the proper time to burn slashings, although he deemed it better to do this work in the fall.

Better organization, both individual and associate, was recommended by A. E. Adelsperger, of the Coos County Fire Patrol Association, to the loggers if the danger of fire from their operations would be reduced. He maintained that responsibility for all fires resulting from logging operations should be fixed in all cases. Too frequently, he said, the foreman of the logging camp

in his anxiety to make a new record in the output of his camp became careless and neglected the necessary precautions to prevent fires.

A. W. Laird, of the Potlatch Timber Protective Association, charged that carelessness on the part of the foreman of the logging camp, the indiscriminate smoking by workmen and inadequate spark arresters were the most serious menaces to timber. Oil-burning equipment in the woods, he said, was desirable, but he predicted that the demands of safety and economy eventually would force the application of electrical power in all big logging enterprises.

In the discussion of this subject, which was general, one speaker proposed that all cigarette smokers be denied employment in logging camps. Although the suggestion was admitted to have merit, the association took no formal action. Another logger proposed that employers supply their operatives in the woods with patented cigar-lighters, on the theory that many of the forest fires result from discarded cigarette or cigar stumps or the careless throwing of an unextinguished match into inflammable debris.

Taking up the subject of railroad fires, F. A. Silcox, of the United States Forest Service, made the assertion that 40 per cent of the forest fires in the country could be charged to the railroads. Three means of combatting the danger of fires from this source were recommended, as follows: Safeguarding railroad engines by the use of adequate spark arresters and equipping fire-boxes with a mechanical contrivance for preventing the scattering of cinders, clearing right of way under supervision of forestry officials and patrolling the tracks.

Earnest co-operation of the railroad officials in his district, reported E. O. Hawksett, of the Pend d'Oreille Timber Protective Association, had been supplied with the result that the number of fires resulting from railroad engines had been reduced to a minimum.

State Forester Elliott, of Oregon, made the announcement that only 5 per cent of the forest fires reported to his office this year were charged to the responsibility of the railroads. "The other 95 per cent," said he, "were caused by the carelessness of logging camp operators."

George A. Day, personal representative of Governor Hawley, of Idaho, a state with 400,000 acres of timber lands, told of the interest the people of his state had in the subject of forest conservation. The last Idaho Legislature, explained Mr. Day, appropriated \$30,000 for the protection of the forests of the state, which for the year had been thoroughly and efficiently patrolled at a cost of only 3 cents an acre.

George S. Long, of Tacoma, president of the Washington Forest Fire Association, discussed public and private co-operation as the only direct and effective means of combatting forest fires and conserving the forest wealth of the West.

"The entire Pacific Northwest has every cause for felicitation as a result of the earnest, hearty co-operation by the Government, state, forest fire associations and railroads in safeguarding timber resources by providing protection from forest fires," said Mr. Long.

"West of the Rocky Mountains we have a priceless treasure. In that area there are 800,000,000,000 feet of timber, amounting to 50 per cent of the

total standing timber in the United States. This will be sufficient to supply all demands for the next 100 years at the present rate of cutting. Fully 80 per cent of the revenue from this resource remains in the several states for labor in cost of manufacturing and marketing the product."

Taking up the subject of reforestation, which Mr. Long declared was equalled in importance only by the need for applying every preventive measure against loss from forest fires, the speaker declared that 75 per cent of the area west of the Rocky Mountains was suited for nothing better than for growing other forests.

George M. Cornwall, secretary of the association, read a comprehensive paper emphasizing the need for education of the public to the importance of the lumber industry as the primary essential towards cultivating their interest and support of legislation essential to the further conservation and protection of this industry.

THE NATIONAL IRRIGATION CONGRESS

ALMOST a thousand delegates attended the National Irrigation Congress at Chicago the week of December 5 and spent several days in discussing irrigation projects, swamp drainage and forest and stream conservation. Governor Charles S. Deneen, of Illinois, welcomed the delegates and many prominent men addressed the convention. President Benjamin A. Fowler advocated amendments to the national irrigation act and urged the reclamation of swamp lands as two of the most important matters to be discussed by the congress. He laid particular emphasis upon the necessity of draining the swamp lands. It was stated that Illinois has 2,500,000 acres of drainable swamp land which could be converted into highly profitable farming property.

R. P. Tello, of the United States Census Bureau, presented statistics showing that there are 5,636,394 acres available for irrigation on which there are no settlers.

State Senator Fred Whiteside, of Montana, spoke on Government Irrigation in Montana and on Tuesday evening C. J. Blanchard, statistician of the United States Reclamation Service, lectured on "Making the Wilderness Blossom."

Wednesday morning the principal topic was drainage. W. L. Park, first vice-president of the Illinois Central Railroad, spoke of drainage as a basis for development; J. C. Longstreet, of Missouri, state aspect of drainage; Dr. W. A. Evans, former health commissioner of Chicago, stream pollution; Prof. Gardner Williams, of Michigan, the uses of the Great Lakes. A special feature was an illustrated lecture by M. O. Leighton, chief of the hydrographic branch of the United States Geological Survey, his subject being the national aspect of drainage.

On Wednesday afternoon representatives of Salvador, Canada, Germany, Peru and British Columbia made addresses, and Arthur P. Davis, chief engineer of the reclamation service, told of irrigation in Western Asia, illustrating his talk with recently taken photographs.

Irrigation in general was discussed Thursday morning by representatives of the Department of Agriculture. Prof. Samuel Fortier, in charge of irrigation investigations, spoke on the present stage of development and made a forecast of the future. There were also addresses by Milo B. Williams, irrigation engineer of the Department of Agriculture; Judge Geo. H. Hutton, of California, and Col. A. R. Lawton.

Other addresses at the various sessions were by Dr. W. J. McGee, of the Bureau of Soils; Norman E. Webster, Jr., of New York; Dr. John A. Widtsoe, president Utah Agricultural College; Hon. Gifford Pinchot, president National Conservation Association; T. W. Taylor, professor of Civil Engineering at the University of Texas; Willard E. Holt, of New Mexico; E. J. Watson, Commissioner of Agriculture, Commerce and Industry of South Carolina; Hon. Dwight B. Heard, of Arizona; Horace G. Clark, of Colorado; M. O. Leighton, of the United States Geological Survey; Dr. W. A. Evans, of Chicago, and Dr. Harvey W. Wiley, Chief Bureau of Chemistry, Department of Agriculture.

REUNION OF YALE ALUMNI

YALE Forest School graduates to the number of nearly one hundred met in New Haven December 20 and 21 for a reunion. It is little more than a decade since the school was founded, and about three hundred men have been graduated. They have returned to New Haven from all parts of the country, and since graduation have been occupied in Federal, State and private forestry, or in educational lines of the profession. The program of events included the following:

Wednesday, December 20—

9.30 A. M.—Registration and informed reception at Marsh Hall.

11.00 A. M.—Class business meetings.

2.00 P. M.—Program at Marsh Hall.

6.00 P. M.—Class suppers.

8.30 P. M.—General smoker.

Thursday, December 21—

8.30 A. M.—Excursion to Maltby Park.

2.00 P. M.—Program at Marsh Hall.

8.00 P. M.—Banquet.

At the first formal meeting, on the afternoon of December 20, President Hadley, of Yale, and Director Toumey, of the Forest School, gave brief addresses of welcome. The program dealt with what the alumni have been doing since graduation. It consisted of a half dozen ten minutes talks by men representing different lines of forestry. Among those who spoke were State Forester Hawes, of Vermont; Professor H. P. Baker, of Pennsylvania State College; Professor Fisher, Director of Harvard Department of Forestry, and Mr. T. S. Woolsey, Jr., of the United States Forest Service.

The smoker in the evening gave men, of different classes, an opportunity to renew friendships and make new acquaintances. The discussion of various forestry problems was a feature of this occasion. Dr. Hadley presided at the banquet and responses were made by several well known foresters.

The field excursion to Maltby Lake on December 21 gave the classes a chance to see the progress of forest management on the New Haven Water Company's property, which has been for ten years the practice ground of Forest School students in silviculture. The afternoon program dealt with the relation of the alumni to the school. Director Toumey gave a progress report of the school for the decade, which was followed by papers presented by W. B. Greeley, of the Forest Service, also a member of the Forest School advisory board, and others. An opportunity was then given for discussion of the course of instruction needed by men now entering the profession, and an opportunity was afforded for frank expression of opinion in reference to the present courses at the school.

At the evening banquet National Forester Graves and Professor Roth, of the Department of Forestry of the University of Michigan, were to have been honored guests, but owing to illness in the family Professor Roth could not be present. Forester Graves, District Forester Ringland, Pinché, Moore, and others responded to toasts in answer to the call of Professor Toumey, who was toastmaster.

DEVOTED HIS LIFE TO FORESTRY

IN the death at Washington, Pa., early in December, of William Crosbie there passed away a man, whom many of his friends claim, was the originator of the idea of forest preservation in the United States. Born in Linlethgowshire, Scotland, eighty years ago, Crosbie came to America on his wedding trip when he was but 21 years of age. In his native land he had spent several years studying forestry in England and Scotland, being associated with members of the nobility in that work. When he and his bride, a young English girl, went to Washington County, Pa., sixty years ago, to visit, the young Scotchman decided to stay there.

More than forty years ago he took charge of the Washington cemetery, and under his direction its 800 acres have been converted into one of the most notable forest preserves in Pennsylvania. In the cemetery are found 600 distinct varieties of trees, there being every tree that can grow in that climate. Among the most treasured of Crosbie's forest pets are a cedar from Lebanon, a cedar from the Himalayas and a Japanese cedar, all imported at considerable expense and all flourishing in their adopted land.

Half a century ago Crosbie began writing on forest preservation and civic beautifying. At first his communications were addressed to the local newspapers with the signature of "Forester," and the suggestions he offered have been carried out in the beautification of the town.

Crosbie, in his zeal for the trees, did not stop here. While still little more than a boy he began writing to the government heads at Washington, urging a forestry commissioner and definite steps to preserve the forests of the land. In the administration of General Grant his ideas so impressed the chief executive that he sent a special recommendation to congress. The recommendation met with the approval of the house of representatives, but was

killed by the senate. Crosbie kept up his agitation and work, however, and lived to see his hopes realized.

DEVELOPMENT OF TIMBER RESOURCES

OPTIONS on over 250,000 acres of timber land in western North Carolina have been secured by the Asheville Timber Company and there has been undertaken the greatest development of timber resources ever known in that section.

The properties secured include over 250,000 acres and contain about one billion two hundred and fifty million feet of spruce, six hundred million feet of hemlock and one billion, one hundred million feet of hardwoods. Practically all the properties are virgin forests and of the very highest grade. Among the hardwoods are the best stands of poplar and cherry that ever grew in this section.

A feature of the woods management will be the placing of the operations substantially under the United States forestry supervision which has opened headquarters in Asheville and is taking options on large tracts of land. The government is planning to install a fire protecting system which will minimize the risk from forest fires.

A notable feature of the development is the complete utilization of all the saw dust and other mill waste from all the mills, at one central power plant, converting it into electric power to run all the mills and factories from which the waste is produced, besides a surplus to operate the big ground wood pulp mill, which is a large consumer of power. The operation of all the plants by electric power eliminates the fire risk to the utmost, and it is contemplated that practically all the buildings will be of concrete.

FIRST PURCHASE UNDER WEEKS LAW

THE first purchase of land under the Weeks law authorizing the creation of the Appalachian forest reserve was authorized at a meeting of the national forest reservation committee in the office of Secretary of War Stimson, chairman of the commission, on December 9. Ten tracts of mountain land, aggregating 18,500 acres in McDowell County, North Carolina, were decided upon by the committee for purchase. The tracts range from 100 to 10,160 acres in size and are located near Mt. Mitchell in the western part of the state and are declared to be excellent for practical forest work. The prices range from three to six dollars an acre, the total cost amounting to about \$100,000. All the tracts are on the watershed of Catawba River, an important tributary of the Wateree River, which with the Congree forms the Santee, a stream of much industrial importance, which with its tributaries is navigable for 250 miles in South Carolina. In taking favorable action upon these tracts the commission was unanimous in the conclusion that it had selected one of the most favorable localities of the southern Appalachian region

for the application of the Weeks law, the purpose of which is the protection and control of the watersheds of navigable streams.

All of the tracts are contiguous, or nearly so, and will form an area large enough for administration purposes and for the demonstration purpose of practical forestry in this portion of the Southern Appalachians. The forest survey had made a careful examination and had reported on the character and value of the land and timber. The geological survey's report said that federal control of the lands will prevent excessive soil wastage and erosion which is likely to ensue if such control is not established. The prevention of excessive erosion, it added, will tend to promote and preserve the navigability of the Catawba River within the watershed of which the district lies.

The commission reaffirmed the announcement made early in the summer that it will not pay any speculative prices for land and will not purchase any land which will not conduce directly to the purposes of the act.

The commission consists of the Secretary of War, the Secretary of the Interior, the Secretary of Agriculture, Senators Gallinger, of New Hampshire, Smith, of Maryland, and Representatives Lee, of Georgia, and Hawley, of Oregon.

SOME FORCEFUL RESOLUTIONS

At the annual meeting of the Empire State Forest Products Association in November, a number of forceful resolutions were passed pledging the influence and support of the Association in various phases of forestry conservation now under way in New York State.

Among them are the following:

RESOLVED, That we approve the bill known as the Jones bill, which was passed by the Senate and Assembly at the last session of the Legislature, and which provides for the exemption from taxation of lands dedicated to reforestation purposes, as we believe that such a law will encourage the use of much otherwise waste land, for the propagation of forest trees, and the increase of forest area of the State, and this Association further respectfully requests the Governor and Legislature next assembling to adopt some such provision.

RESOLVED, That we endorse the public spirited, unselfish efforts of the Camp Fire Association to investigate, and, under the able and intelligent direction of the Hon. Gifford Pinchot and Hon. Overton W. Price, suggest improvements in the methods employed in lumbering the Adirondack forests; and we pledge our co-operation in support of any reasonable reforms, and in establishing rational scientific forest management, with due consideration to our business and commercial interests.

RESOLVED, That we express to the Association for the Protection of the Adirondacks our honest desire to confer and co-operate with them for the purpose of harmonizing the several interests in the Adirondacks, to the end that this vast estate of the people may be operated and maintained for the greatest good of the greatest number.

WHEREAS, The experience of practical lumbermen proves conclusively that the prevention of forest fires will do more to conserve our forest wealth, both present and prospective, than any other one thing; therefore, be it

RESOLVED, That the Empire State Forest Products Association is in favor of strengthening, extending and perfecting the laws relating to the prevention of forest fires and the protection and patrol of our forests.

WHEREAS, The forced interpretation of Section 7, Article 7, of the State Constitution, by various State officers, has resulted in preventing the people of this State from enjoying their rights in the Adirondack Park,

RESOLVED, That the Conservation Commission be requested to pass regulations which will place an intelligent interpretation on said Section 7, Article 7, and permit the use of the dead and down trees for camp fires and other purposes, and will permit the building of roads and other means of cheap and ready transportation.

RESOLVED, That the Empire State Forest Products Association heartily approves the farsighted constructive policy of our honored Governor, John A. Dix, in creating the State Conservation Commission, and in entrusting to its hands the management and development of the great natural resources of this State, and we heartily pledge our earnest co-operation in this great work.

The London, England, Standard says: "Steps must be taken to secure a larger supply of trained woodmen before any extensive scheme of afforestation is attempted. Until 1904 there was no school in the United Kingdom where young working men could obtain theoretical and practical instruction in forestry."

The second annual meeting of the North Carolina Forestry Association will be held sometime during the latter part of January, 1912, probably at Raleigh. The forestry movement has advanced with leaps and bounds in most of the other states and North Carolina cannot afford to hold back any longer where she has so much at stake.

Although the forest fire season is over, State Forester Cox, of Minnesota, expects to have much real work for his rangers and patrolmen during the next five months. The principal work will be to enforce the law regarding the burning of slash and tops where there are logging operations.

The Detroit Free Press says: "A visitor in Detroit recently made the rather striking statement that Uncle Sam is beginning to make money out of his forest reserves, offering as proof the information that the timber cut during the last year will bring in a revenue of \$2,000,000."

District Forester E. A. Sherman, of Utah, reports that the wool growers of the San Pete country all unhesitatingly state that the range this year was in better condition than it has been at any time since the creation of the Manti National Forest. There was an abundance of feed for their stock.

People residing in Minnesota and in several of the adjacent states have, during the past summer, purchased two thousand acres of timberland in Beltrami County, Minnesota.

THE ADIRONDACK PROBLEM

A REPORT MADE BY HON. GIFFORD PINCHOT TO THE CAMP-FIRE CLUB OF AMERICA, NEW YORK CITY, DECEMBER 2, 1911.

FORESTRY in the State of New York is flourishing everywhere except in the woods. This is the essential fact in the present situation. The Constitution forbids the practice of forestry on State lands, and scarcely a single tract of privately owned forest, either in the Catskills or the Adirondacks, is today being cut under the rules of practical forestry. On the other hand, within the last ten years the destruction of forests by fire and bad logging has been greater than ever before.

The Adirondack forest is one of the most precious possessions of the people of the State of New York. In conserving water-flow and supplying timber, as a recreation ground, and as a vast sanitarium, it is indispensable to the growth and welfare of the State. The purchase of the Adirondack Park is probably the best investment the citizens of New York ever made.

The Adirondack Preserve consists of all State lands in the twelve Adirondack counties, and includes about 3,300,000 acres. The Adirondack Park includes only State lands within the so-called "blue line," 1,500,000 acres in area, or about half the total area the "blue line" bounds.

The other half is owned by lumber companies, associations, clubs and individuals. Substantially all of it is useless for any other purpose than to grow trees. The tree growth upon it, however, renders so many and such important services that no similar forest area in the United States is of such high value to so many people.

The object of this report, prepared on behalf of the National Conservation Association for The Camp-Fire Club of America, is to make it easier for the people of New York to get the benefit of the Adirondack forests, and to protect them against waste through mis-use and non-use.

The first duty of the State towards the North Woods is to protect them from fire. Because of previous neglect not less than a quarter of the whole area has been burnt. Of late, and especially since the great fire of 1908, good work by the State fire patrol has much reduced the number of fires. But it is not enough that there should merely be fewer fires in the Adirondacks. There should be no fires there at all.

NEED OF FIRE PROTECTION

The principle of controlling a fire in a forest is precisely the same as that of controlling a fire in a city. The essential thing is to get the necessary fire

fighters on the spot without the needless loss of a second. To this end mountain out-look stations have been established through the Forest Preserve and connected by telephone with villages and towns, so that fires may be promptly discovered and fire fighters concentrated upon them with the least possible delay. The foundation for an admirable organization has been laid, but at least ten additional stations are required.

Every forest officer in the Adirondacks should have a list of the most willing and efficient men for fire fighting in his locality and where they can be reached, so that in case of emergency he may make the promptest use of the law authorizing him to call men out to fight fire. Organizations of citizens should be formed to supplement the salaried force, and further definite arrangements should be made in advance for gathering men, equipment and supplies without loss of time when the need arises.

The present cost of fire protection is six tenths of one cent per acre per annum for a property whose average value in timber alone is not less than ten dollars per acre. Stated in another way, there is but one fire patrolman on forest lands in the Adirondacks to one hundred thousand acres. Lumbermen in some of the Western States are now spending nearly four cents an acre for fire protection on lands of their own, which are no more valuable in money and far less important to the community than the North Woods. More than double the present force is badly needed.

The present fire law, which rigidly forbids any burning of brush at certain seasons, regardless of the weather, and permits it at certain other seasons, equally regardless of the weather, often increases the danger from fire. Burning should not be allowed at any time except under permit, and with the personal presence and supervision of a forest officer.

The law now requires that the tops of coniferous trees shall be lopped immediately after felling. The snow crushes lopped branches close to the ground, so that they keep moist, rot more promptly, and lessen the risk from fire. Some criticism has been made of the value of lopping tops. From personal observation on land lumbered as much as twenty years ago where no tops were lopped, and on similar land in the Adirondacks lumbered ten years ago where lopping was practiced, I can assert with confidence that lopping does accomplish its purpose in making the forest safer against fire. Spruce tops honestly lopped rot down in ten years more thoroughly than unlopped tops in twenty, and even at the end of six or seven years present little or no material to feed a fire. Fire on areas well lopped is much easier to fight than on unlopped lands, reproduction of the forest is not hampered, and the general effect is entirely good.

TRAINED FOREST FORCE NEEDED

The efficiency of a forest force depends less on good laws than it does on good men. In the past the State forest force has at times been composed largely of political appointees, and has suffered in consequence. While a great improvement in the force has taken place, I recommend strongly that this im-

provement be maintained and increased by requiring all members of the forest force to pass a Civil Service examination before appointment, and by giving permanent employment to as many men as possible. Some temporary fire guards will always be required, but men employed during only a part of the year take less interest in their work and render poorer service than members of a regular force who expect to follow one line of work during their lives. Without permanent employment, the State cannot compete for the best men with other employers, and will have to take what they leave. The thorough enforcement of the top logging law alone would require the services during the winter of the larger part of the present force.

The Civil Service examination for such men can and should be made thoroughly practical by bearing on their training and experience as woodsmen and fire fighters, and their local knowledge of the country in which they are to work, and by actual test of physical ability and woodcraft conducted in the forest. This practice, applied in the National Forests of the United States has contributed more than any other single cause to the efficiency of the field force.

The salaries of the patrolmen are too low. They should be increased from \$60 a month, as at present, to \$75 a month, with the certainty of reasonable promotion for good work. In every practicable case, appointments to higher positions should be made by promotion and not by the selection of men outside the present force. The title "patrolman" should be changed to "forest ranger," for the duties are very much wider than fire patrol alone.

The Adirondack Park contains not less than 120,000 acres of forest land so completely denuded by fire that planting is necessary. In many places not only the forest but the soil itself has been burned entirely away and the bare rock is exposed. There is also about 50,000 acres on which planting is desirable to reinforce the present sparse young growth. It is most fortunate that the State is admirably prepared for the planting work. Its forest nurseries, under the direction of Mr. C. R. Pettis, Superintendent of State Forests, have become models both in the quality of the stock produced and the low cost of growing it, while the forest plantations set out by the State are among the most successful in any country.

During the last few years, very little forest planting has been done on the State land, because the sale of seedlings to private owners at cost has taken nearly the entire product of the nurseries. Private owners should be able to buy seedlings from the State, but it is at least equally important that the State should begin on an adequate scale and without further delay its own great task in forest planting. For this purpose the capacity of the nurseries has recently been increased to produce about eleven million young trees a year. At least 5,000 acres a year should be planted up. At this rate, if no more land is devastated by fire, it will still require a quarter of a century to reforest the denuded State lands within the Adirondack Park.

PROOF OF PRACTICAL FORESTRY

The results of work done on the Webb and Whitney tracts under my general supervision and under the direction of Mr. Henry S. Graves, now Chief of the United States Forest Service, have proved beyond contradiction that forestry is practical from every point of view in soft-wood logging in the Adirondacks. On both these tracts, whose total area is over 100,000 acres, each tree to be cut was marked, and as a rule sound spruce trees below ten inches in diameter were left standing. Dead trees enough were left to provide for a second crop, the forest cover was conserved by moderate cutting, simple rules were enforced to prevent waste of timber and injury to young growth in the logging, and the tops of felled trees were lopped as a safeguard against fire.

The forest was improved and the work paid. The proportion of spruce trees in the woods is already increased, and the older cuttings are even now ready to produce a cut of spruce as valuable as the first crop. The beauty of the forest is unimpaired, and there is little sign, except the abundant young spruces, an occasional moss-covered stump, or the trace of an old logging road, that the forest was ever lumbered at all.

But in face of these notable exceptions, and of a quarter of a century of explanation and agitation, conservative lumbering in the Adirondacks has made little or no progress. The usual destructive treatment of private timber lands today makes it perfectly clear that the general adoption of forestry in the Adirondacks can be brought about by law, and in no other way. This is true in spite of the fact that in very few places in the United States is the financial and physical opportunity for practical forestry so good as it is here. Yet nowhere has needless destruction gone further.

It is time to stop playing with the situation. Ostensible efforts at private reforestation, in which tens of acres are replanted for hundreds or thousands that are destroyed, merely serve to distract attention from the main issue. What is needed on privately owned timberlands is the proper handling of the forest, and not inadequate replanting after its destruction. The present method, if allowed to continue, will inevitably result in the devastation of substantially all the Adirondack timber lands held for lumbering purposes, as well as in the burning of large areas of State lands by fires starting in the slash thus caused. And in the end the State itself will be forced to take over these denuded lands and replant them at great expense.

More is done to help the lumbermen by the State of New York than any other State in the Union. The maintenance of the mountain lookout station and the cost of fire patrol is paid for entirely from the State funds. In several Western States the lumbermen voluntarily bear these expenses themselves. When a logging crew is requisitioned by a New York forest officer to fight fire on the land of a lumberman, that lumberman is reimbursed for the time spent by his own men in protecting his own property. State taxes on forest land in the Adirondacks are negligible, while other taxes are generally based on so low a valuation that they do not hinder forestry. Yet in spite of all this, these mountain forests, in which every citizen of the

State has a real interest, continue to be destroyed without let or hindrance. It is time to stop.

I would not be understood as charging that the Adirondack lumbermen as a body are bad citizens, or that they are purposely injuring the State which protects them. On the contrary, many of them are anxious to improve the present unfortunate conditions. For example, the Emporium Lumber Company, which owns about 82,000 acres of Adirondack forests, has agreed to carry out a plan for cutting, to be prepared by the writer, on an area of one square mile, as a first step toward what I hope will be the conservative logging of the whole tract. As Mr. W. L. Sykes, President of the Company, well says, the difference between conservative logging and forest destruction is that in the one case the timber land is an increasing asset, in the other a diminishing one.

PRACTICAL LEGISLATION REQUIRED

One of the most important recommendations I have to make is that The Camp-Fire Club shall invite a Committee of the Empire State Forest Products Association to join with a committee of its own in working out the details of practical legislation, which shall protect the interests of the lumbermen at the same time that it prevents the destruction of the forests. Mr. F. L. Moore, President of the Association, has already expressed his entire approval of this plan. The Conservation Commission should be represented at any such conference by the Superintendent of State Forests. In my judgment, a perfectly practicable scheme can be worked out under which the added cost to the lumbermen of practicing forestry as against destroying the forests should seldom if ever exceed a cost of 25 cents per thousand feet of logs cut.

But not all of the Adirondack lumbering concerns are controlled by men of good will. A peculiarly aggravated case of needless and conscienceless vandalism is supplied by the Brooklyn Cooperage Company, a subsidiary organization of the Sugar Trust. The logging done by this company is more destructive than any other with which I am acquainted in the Eastern States, and the damage by fires for which its carelessness is said to be responsible, will cost the people of New York large sums of money and long years of time to repair. When requested by the Conservation Commission to take simple and necessary precautions against fire, it peremptorily refused to do so.

The Brooklyn Cooperage Company controls by ownership and lease 123,000 acres in the Adirondacks. Unless this organization is restrained by the strong hand of the State, every acre of that land will be despoiled of its forest growth and swept clean by fire.

In my judgment, to destroy in this fashion forests whose destruction hurts the State is as much a mark of bad citizenship as for a man in town to set fire to his own house. There is no more moral right in the one case than in the other; and the time is rapidly approaching when there will be no more legal right either.

I recommend the passage of a law which will require the lumbermen

inside the Adirondack Preserve to carry out such a degree of practical forestry on their timber lands as will reduce the damage from fire to the lowest practicable point, and insure the perpetuation of the forest. In each case the plan of work should be approved and its execution should be supervised by the Conservation Commission through the Superintendent of State Forests, who is now and always should be a trained forester. The State should prepare practical cutting plans for lumbermen at their request, and siderable increase should be made in the number of trained foresters now otherwise assist with information and advice, and for this purpose a con-
available.

DISPOSAL OF PRIVATE LANDS

To compel private owners to cease cutting altogether on certain mountain lands which should be kept untouched for the protection of the slopes and of the water supply, would be an unfair burden upon them. The private lands of the Adirondacks should therefore be divided into so-called "protection forests," on the steep high slopes, which should never be cut at all, and the commercially valuable timber on the lower slopes and rolling lands, upon which cuttings should be regulated by the State. As rapidly as possible the State should acquire the protection forests and look after them.

Section 7 of Article 7 of the New York Constitution is as follows:

The lands of the State, now owned or hereafter acquired, constituting the forest preserve as now fixed by law, shall be forever kept as wild forest lands. They shall not be leased, sold or exchanged, or be taken by any corporation, public or private, nor shall the timber be sold, removed or destroyed.

In practical effect this section does more to limit and restrict the use of the Adirondack Park by the citizens of New York than all the other causes combined. Under it citizens of the State are prevented from constructing cheap wooden camps along the borders of lakes and streams controlled by the State, leaving the wealthy owners of elaborate so-called "camps" undisturbed by the proximity of poorer neighbors. The purchase of camp sites on private lands, even if any were still available, is beyond the reach of persons of average means. Such camp sites, I am informed, have sold for as much as \$100 per foot of water front.

The State should lease small camp sites on terms which will encourage the enjoyment of the Park by as many people as possible, keeping open, however, not less than one-quarter of every lake and stream for the general public. The use of the State lands by every man, woman, and child who can manage to get there should be assisted and made easy in every practicable way. The lessees of camp sites would constitute in effect a large volunteer fire department constantly on guard, to whose personal interest it would be to prevent or put out every fire.

Section 7 likewise prohibits the construction on State land of roads and trails needed to make the people's property accessible to the people. It is well known that roads and trails form an admirable protection against fire. Because of their absence the Adirondack Park is needlessly exposed to the risk of conflagration.

In another way also this section increases the danger of fire on State lands. Substantially all of the recent State purchases consist of logged or burned land, containing great quantities of dead and down brush and timber. The removal of these fire traps is now forbidden by Section 7 and the danger from fire correspondingly increased. In some cases while great quantities of timber are decaying on the ground, green trees are necessarily cut at increased expense to supply the indispensable fuel. Already those who live in villages surrounded by forests owned by the State, must pay excessive prices for firewood brought in from private lands.

Under this section the development of water power by storage on State land is forbidden because it cannot be done without killing some trees. Thus one of the principal resources of the State is kept unused, without any corresponding benefit to the people.

Section 7 forces the State to hold lands outside of the "blue line" boundary of the Adirondack Park, which in many cases are far more valuable for cultivation than as forest. It ought to be possible to exchange those small isolated areas of State land, now merely a burden and expense, for land inside the "blue line" which the State really needs for park purposes. Some extension of the "blue line" is required, in order that it may enclose all Adirondack forest lands whose protection is urgently needed for the general welfare.

When Section 7 of Article 7 was included in the Constitution, there was good reason for doing so. At that time the recent history of the Adirondack Park contained a malodorous series of transactions in which at every turn the State got the worst of it. Not without cause the people of the State came to believe that the only way to save the Adirondacks from mis-use was to forbid them to be used at all.

PUBLIC SENTIMENT AROUSED

The situation today is entirely changed. In my judgment, the people of New York may now safely trust themselves to administer their own forest property with honesty, sagacity, and skill. The State of New York now has a forest department governed by safe standards of public service, and actually accomplishing results of real public value. The supply of trained foresters in the United States is fortunately sufficient to enable the State of New York to build up the necessary force under the direction of the Superintendent of Forests. Public sentiment is now generally aroused and informed as to the value of the people's property in the Adirondacks, so that a repetition of the old mismanagement has become impossible. To continue to lock up the Adirondack Park against use will do no good and much harm.

It is not as well known as it should be that Adirondack land may be, lumbered and the product put to use, not only without injuring the forest, but to the improvement of its condition and value. The public mind has been somewhat confused by the unfortunate experiment on the Cornell lands at Axton. The practice here was directly opposite to that on the Webb and Whitney tracts above referred to. At Axton the logging destroyed the forest

cover by cutting clean. It was financially unprofitable, so that money to replant ran short. For the same reason, the slash was left on the ground, a promptly accepted invitation to forest fires. Finally, the Cornell experiment did not conform to the first principle of true forestry in the Adirondacks which is to secure natural reproduction from seed trees left standing after cutting only trees carefully selected and marked.

SOME PERTINENT ADVICE

Good forestry on State lands in the North woods demands cutting so moderate as not to destroy forest conditions, or seriously disturb the forest cover. Practical forestry in the Adirondack Park should begin slowly and at first should cut not more than 1% of the Park each year. The first consideration in all cuttings should be to improve the forest. Clean cutting should be forbidden by the Constitution. So should cuttings so heavy as to impair or interrupt the forest condition or require the planting of trees after logging. All logging in green timber should be directed to encourage young growth, and all sound spruce trees below fourteen inches or hardwood below eighteen inches in diameter should be left standing.

Before the Constitutional question whether practical forestry shall be permitted in the Adirondack Park is submitted to the people for action, the Conservation Commission should be called upon to lay before the Legislature and the people a full description of the methods of practical forestry which it is proposed to apply, and the results these methods are intended to secure.

In a virgin forest, as the young trees grow up, the old trees die and fall to the ground, thus supplying fuel for forest fires. In a properly handled forest, mature trees are cut down and the slash disposed of, so that an Adirondack forest carefully and properly logged presents no greater invitation to fire than one not logged at all.

The timber in a virgin forest does not increase in quantity, because the growth of the young timber is offset by the death and decay of the old. But in a well handled forest the amount and value of the standing timber steadily increases. The result of practical forestry in the Adirondack Park will not be to decrease the future supply of timber, but to husband and increase it. It is not only to the interest, but it is the duty, of the State to put its forests in the best possible condition to be useful to the people. That cannot be done without the wise use of the axe.

The wide use and more efficient protection of the Adirondacks demand a change in the Constitution. Without attempting to use exact legal language, I suggest that Section 7 of Article 7 might well be amended to read somewhat as follows:

"The lands of the State, now owned or hereafter acquired, constituting the Adirondack and Catskill Parks as fixed by law, shall be kept as forest lands. They shall not be sold or exchanged, or be taken by any corporation, public or private, and no timber shall be cut on said lands except in accordance with the principles of conservative forestry, nor shall the permanent forest

conditions of any such land be interrupted, endangered, or destroyed by clean cutting or otherwise."

Since The Camp-Fire Club does not desire at this time to take up the question of water power, I have to add merely that the principles upon which this part of the larger problem of the use of the Adirondacks should be decided I believe to be these:

First.—State development, ownership, construction, and control of water power on State lands.

Second.—Fair compensation to the State for the use of power thus created.

Third.—Regulation of rates charged to the ultimate consumer.

Fourth.—Coöperation with the National Government for the complete development and control in the public interest, of all power on navigable and other streams within the State.

This report is based on the field work and experience of Mr. Overton W. Price, my associate in the United States Forest Service and the National Conservation Association, and myself. It ends as it began. Forestry is flourishing in New York everywhere but in the woods. The time is ripe for a change.

Game wardens of the northeastern section of Pennsylvania have caused arrests during the last few weeks since the hunting season opened of a number of hunters found lighting fires in the woods, thus preventing a number of destructive forest fires which spread rapidly in the sections where the timber is mostly second growth.

State Forester Cox figures that the average annual fire loss in the woods of Minnesota is \$5,000,000. This appalling figure he justifies by statistics that withstand criticism. An annual appropriation of \$75,000 is all that the legislature has made to use in work towards preventing this loss.

Parties who have spent part of the summer in the Olympic Mountains found that lightning is undoubtedly responsible for many forest fires. The trees were found splintered by the lightning and areas for miles square were burnt over adjacent to these trees.

Do not overlook the fact that a very desirable Christmas present for a friend, costing but three dollars, is a membership in the American Forestry Association and a subscription to this magazine for a year.

Assistant District Forester T. C. Hoyt, of Utah, has gone to Boise, Idaho, for the purpose of inspecting a recent claim in controversy on the Southern fork of the Payette River in the Boise National Forest.

STATE NEWS

New Hampshire

Speaking of the development of the forest policy of New Hampshire, Governor Robert P. Bass, of that State, in an article in the *Christian Science Monitor* says:

"There is developing throughout New Hampshire an appreciation and practical understanding of the importance of forestry. It has been estimated by experts of the United States forest service that about 60 per cent. of the land surface in the State is better suited to the growing of forests than farm crops. A great deal of this land, though too rocky or steep for farming, has good soil and produces rapid tree growth. These natural forest soils being near the large markets will enable the owners more and more to sell all the products of the forest at a profit.

"The forest policy of the State is developing along three lines—the protection from fire of timber now standing and the young growth coming on; the reforestation of waste or unproductive land, and the acquisition of forest land by the State and the United States.

"The system of fire protection is based on cooperation between the State and the towns. A warden is appointed in each town to have charge of fire fighting, the State and towns sharing equally in the expense. The State directs the work of the wardens and operates 15 mountain lookout stations for the discovery of incipient fires.

"A notable feature of the fire protection work is the organization of the timberland owners of northern New Hampshire, who have formed a cooperative association representing an ownership of over 1,000,000 acres, on which they assess themselves one cent per acre per year, and use the fund for patrol in times of drought, for additional lookouts and for the establishment of caches of fire-fighting tools in convenient places.

"New Hampshire was the first State to benefit by the Weeks act. During the summer of 1911 a cooperative agreement was entered into with the Secretary of Agriculture by which the State received the services of 24 federal patrolmen.

"The reforestation of cut-over land and waste land has enlisted the interest of small owners for a number of years and is increasing rapidly. Within the past two years several large owners have begun reforestation operations on an extensive scale. The State operates a forest nursery for the distribution of young trees, and two commercial nurseries are successfully growing forest tree seedlings on a large scale.

"The public ownership of forests has been strongly urged by New Hampshire for the

past decade. This is especially important with high mountain forests, where the growth is so slow that private capital cannot handle them as conservatively as they should be handled to protect the forest cover for the scenic effect and the regulation of stream flow. It is to be hoped that under the Weeks act the United States will soon acquire a large amount of the White mountains as a national forest.

"The sentiment in favor of State ownership has increased to such an extent that the last Legislature passed an act for the purchase of the Crawford notch as a State forest. Three small tracts have been received by the State as gifts. Such tracts should be used as forest experiment stations to stimulate an interest in private forestry. In this connection it is noteworthy that a number of towns own small tracts of woodland which could be made quite profitable."

Maine

Forest Commissioner Mace, of Maine, says that lightning was responsible for the majority of forest fires in Maine last summer.

"The majority of these fires," said the Commissioner, "were traced back to the starting point. They always buck the wind.

"The big Frenchtown, Lobster Mountain, fire was started by lightning striking a green hemlock. We found the hemlock which it hit. The fire on Enchanted Mountain, which burned over 8,000 acres was started by lightning, as was the Pine Stream and Deer Pond fires."

Mr. Mace says the result of the year's work has demonstrated the value of the fire patrol and lookout service. In consequence of this branch of the State's work many millions of dollars' worth of lumber has been saved. He points out that Maine has between 9,000,000 and 10,000,000 acres of timber land worth \$45,000,000 and with all the great fires which raged in the State during the summer the total loss will not much exceed \$200,000. This, he says, could only have resulted from the efficiency of the service.

Massachusetts

The fire lookouts stationed by the forestry department in various sections of Western Massachusetts during the past few weeks have been relieved for the winter, but their service has covered a sufficient period to make the success of the plan very apparent. The fall has not been as dry as those of the past few years, and the danger from forest fires has been correspondingly decreased, but several cases have been reported where the lookouts have discovered fires soon after they

started and by prompt notice to fire wardens in the vicinity have brought about the extinguishing of the fires before they had reached dangerous proportions. The danger from fires is usually far greater in the spring, and it is understood that the lookouts will go on duty then, probably in April. Faithful work by the lookouts in a dry season is sure to mean a big saving of property, and the system is one that should be maintained.

New York State

New York State now has on hand 11,000,000 trees to be used in replanting denuded State lands and for sale to private land owners at cost. With the establishment of a new nursery this year and the extension of the old nurseries, the output of trees next year will be doubled. Within three years, at the present rate of increase in public and private tree planting, at least one tree will be started for every one cut down. It is estimated that last year five trees were destroyed to every one planted.

Maryland

Fire protection has been afforded forests in Washington, Garrett, Allegany, and Frederick counties, Md., by the Department of Agriculture in cooperation with the State authorities. The government will spend \$600 during the year for forest patrols and other protective measures.

The State authorities have selected the patrolmen, and these will follow a route determined by maps of the localities.

North Carolina

Daniel W. Adams, of the Forest Service, has examined 5,000 acres of land in Burke Township and will report on it to the Forest Commission. The commission will consider about 120,000 acres situated in the Nantahala, Mount Mitchell and Pisgah areas in North Carolina, the Savannah area in Georgia and the White Top area in Virginia and Tennessee.

These lands will be recommended to the commission by the field force who examined them. Mr. Adams said that there is a great deal of land in the Pisgah and Smoky mountain areas which the men in the forest service have been unable to reach yet owing to insufficient field force.

Mr. Adams is enthusiastic in his efforts to have the State avail itself of the \$200,000 available annually from the government for the next five years for the purpose of keeping down and fighting forest fires in the sections in which lands will be purchased by the government.

Kentucky

The women of Kentucky are actively working in the interest of the forestry bill which is to be presented to the legislature and are arousing a great deal of influence in favor of the bill. At a meeting of the Legislative Committee of the Women's Club of

Louisville, the other day, Mrs. Mason Maury of Louisville gave an analysis of the present condition of the timber resources of Kentucky and the workings of the proposed bill, which is designated as "an act to establish a State board of forestry, and prescribing its duties."

"Our annual timber growth is at a minimum," said Mrs. Maury. "We are cutting wood but not producing. At the present rate of consumption sixty-five counties will be without merchantable timber in from two to eight years. The value of the timber as it leaves the forest is \$24,000,000 annually, and it rests with us whether or not we preserve this enormous income, which affects the prosperity of every citizen, or whether we supinely allow the destruction of Kentucky's forests.

"If it is to be saved, we must have better forest management, educative and legislative."

In this connection Mrs. Maury suggested a course in forestry be included in the curriculum of the public schools, even if other courses of study be eliminated or abridged.

At the close of the address a vote of approval on the part of all present at the meeting, whether members of the club or not, was given the plan as outlined by Mrs. Maury, and support for the measure promised.

Arkansas

Forest Supervisor Francis Kiefer says of the forestry work in Arkansas:

"The greatest progress of the year was the improved efficiency of the fire protection service throughout the national forests in this district. This marked advance is due to better organization of the fire fighting force.

"Eighteen look-out stations will be erected in the Ozark and the Arkansas national forests upon the highest mountains, which will enable the watchmen to see every part of the forest. Every tower will be equipped with a range-finding instrument and a chart; and a fire may be located the minute it starts. A telephone connection with the Forest Rangers will bring out the fire fighters at once.

"While it is true that whole forests are not consumed here as the big fires in the Rockies and the Northwest are, the effect is no less damaging. The young reproduction, which represents our future forests, is entirely destroyed in case of fire, and, although it is replaced, it consists mostly of sprouts and revived seedlings, which never can make the healthy growth of seedlings unscathed by fire. The forest floor, the grass and leaves, is wholly destroyed whenever there is a fire.

"The coöperation of the settlers in the national forests in fire protection is a great aid in the suppression of fires."

Colorado

District Forester Smith Riley, of Colorado, is preparing a recommendation that 20,000 acres on the watershed of Pike's Peak be re-

forested. This action is the culmination of five years' experiments in tree planting in that district, during which 750 acres have been reforested. An appropriation of about \$100,000 is necessary, and if it is granted the work of turning the slopes of Colorado's most famous mountain into a vast forest will begin next year.

The task will be a gigantic one. An average of 1,000 trees will be planted on each acre, which means 20,000,000 trees. Yellow pine and Douglass fir will be the species used. These trees reach a size sufficient for railroad tie manufacture in about ninety years. The effect of their presence will be seen in the water supply of the district long before they reach that growth, however.

The officials have selected Pikes peak for the first great Colorado reforestation enterprise principally because Colorado Springs, Pueblo, Victor and a thickly populated agricultural country get much of their water from its slopes.

The effect of the new forests will be seen in a few years. The trees and other vegetation will check the melting of the snow in spring, thus distributing the spring floods through the "dry" months.

This forestry district collected last year 12,000 pounds of pine and fir seeds in preparation for this and other reforestation ventures. Each pound represents approximately a bushel of cones and costs about \$1.

California

The Federal Department of Forestry located at Los Angeles has begun the work of reforestation on the southern California national reserve. This is under way in the Santa Ana canyon near Seven Oaks. At that point 40,000 conifers, hardy varieties of pine, fir and redwood will be planted.

San Diego is perhaps the first of American cities to inaugurate a great forestry enterprise in the expectation of speedily decreasing the rate of taxation and possibly of ultimately relieving the citizens of all payment of taxes for the support of the city government. The city owns 7,000 acres of land, which up to the present time has been unproductive. Forty thousand seedlings of the eucalyptus tree have been set out. The city officials expect when the forest is twenty-five years old it will yield \$175 worth of timber per acre annually. That means \$1,225,000 a year. With expenses deducted, this will leave a profit which will go far toward reducing the burden of taxation.

Oregon

Plantations of useful trees are to be established in Eastern Oregon in the districts where the settlers are finding need for nearby fuel supply and timber for fence posts. The State Forestry, in connection with the Forestry Department of the State Agricultural College, will carry on experiments to learn tree-planting possibilities.

Plantations will be started to learn what trees makes the best growth in Eastern Oregon soil and the information will be furnished to ranchers so that they may have the benefit of this experience in developing their farm lands. The inquiry will be extended to determine the best shade and ornamental trees for the various sections of the interior.

Indiana

E. J. Hancock, Secretary of the Indiana Forestry Association, has just completed the organization of the Cass County branch of the Indiana Forestry Association. Already twelve counties in the state have been organized and will work in connection with the central body toward preserving the forest land of the State, stimulating interest in the care of trees and in the planting of new ones.

The Cass County Horticultural Society, already well organized and with a particular interest in the care, preservation and growth of fruit trees, will form a valuable aid to the forestry society.

Governor Marshall, former Vice-President Fairbanks and other leading men of Indiana are members of the forestry association and have volunteered their services in any county where auxiliary branches are being formed whenever they can spare the time.

Ohio

The city of Cleveland has now almost completed a campaign of tree planting which will add 2,000 trees to the 150,000 which help to make Cleveland the Forest City.

City Forester Rettig's chief work has been ridding the city streets of the poplars.

Every opportunity has been seized to destroy them and replace them with elms, maples or sycamores. The 2,000 trees planted this fall and winter take the place of the poplar.

Forester Rettig's conservation plans include the adoption of some of the forestry methods in use in Germany and England. With these methods Cleveland could have trees even where grass and good soil are now unknown, Rettig says.

"They take care of their trees in European cities," said Rettig. "We are doing all we can here, but they are ahead of us in some things, especially in planting. We are as far in advance in Cleveland in spraying and otherwise treating trees as they are in Europe."

The local forestry department bought trees for the first time this fall by competitive bidding. The result was a better class of young trees at a cheaper price. The 2,000 now being planted cost the city from 75 cents to \$1 apiece.

Forester Rettig looks for Cleveland to retain her title of the Forest City despite the continued growth of industries and the consequent smoke-laden air so harmful to tree life.

NEWS AND NOTES

Instruction in Forestry

The recently established department of forestry in the New York State College of Agriculture at Cornell University is finding that forestry is a subject of genuine interest to the students of the university. The department will now be able to increase the scope of its work because of the addition of an assistant professor to the staff. Mr. John Bentley, Jr., a graduate of the Yale Forest School in the class of 1907, and at present in charge of the planting in District 2 of the United States Forest Service, has been appointed to the assistant professorship, and will enter on his new duties on January first. The department is ready to supply a lecture on forestry to meetings of any kind in New York State.

Canada's Forestry Problem

Speaking of the need of arousing pressing interest in the reforestation of hard wood areas in Eastern Canada, H. R. MacMillan, in *The Canadian Century*, says: "There are two points to be made; first, that the supply of wood suitable for manufacturing purposes in Eastern Canada is practically exhausted; the other, that large Canadian industries, dependent upon valuable hard woods, are forced to import their raw material from the United States at high prices, and are, therefore, at a disadvantage in competing with United States manufacturers. The remedy for the manufacturer lies, not in using less wood, but in using his influence to see that cities, counties or provinces take steps to reforest with valuable woods the many areas of waste land, now lying unproductive, which may be found in every county in Eastern Canada. The German cities own forests, the municipalities corresponding to counties and provinces in Switzerland and France own forests, managing them for the production of timber for industrial purposes, and for revenue. Several of the Eastern States—New York, Vermont, New Hampshire, Connecticut, Massachusetts, Pennsylvania, and New Jersey—have purchased waste land for reforestation. Finding that work was not proceeding rapidly enough, and that the administration of these hard wood lands could be better managed by the Federal Government than through several State Governments, Congress has appropriated for the purchase of lands in the Eastern States, to be managed by the Forest Service as a perpetual source of high grade hard wood timber. The appropriation of this money was secured largely through the support of manufacturers.

"There is no record that, with the exception of the Canadian Pacific Railway Company, any private corporations in Canada have undertaken to grow on their own lands the timber they will require. The Canadian Pacific Railway Company employs several trained foresters, and is at present making an examination of its timber lands in British Columbia with the idea of managing them for the perpetual production of ties and other construction material."

Some Plain Facts

Prof. Hugo Winkenwerder, of the University of Washington, in a recent talk on the present status and future problems of forestry gave some plain facts and statistics of particular interest to any new student of forestry. He said: "There are problems of great economic and national importance which can only be solved by forestry.

"Our national idea of forestry did not take root until 1891 when Congress authorized the President to set apart forest reserves. We have now 150 national forests, which embrace 195 million acres. Twelve states have adopted the policy of owning forests within the State. A score of universities and colleges are offering courses in forestry.

"The practice of forestry in the United States as yet consists of little more than fire protection. It is important that we have re-production, rapid growth and a large yield."

The means employed to prevent fires Professor Winkenwerder said, were broad trails free of inflammable materials, telephones installed and fire patrols.

"The forests of the United States average only 12 cubic feet growth per acre per year. The forests of Europe average 36 feet per year. It has been estimated that about 80 per cent of our forests are only half stocked with trees.

"A great many of our forests are over mature and ought to be cut out. A great part of the forest area has lost its fertility, because the water has washed off the fertile soil or the sun has dried up the soil."

Reforestation Legislation

State Senator George F. Argetsinger, of New York State, with a view for providing forest revenues for future generations has prepared a bill which he will introduce early in January which will encourage farmers to plant trees on land that is not tillable. Senator Argetsinger has found that there is considerable such land on a large number

of farms in the State, and he knows of no better purpose to which it could be put.

"What I want to do is to work out some plan to make it an object to the farmer to plant land with trees," says Senator Argetsinger. "I believe that if the tax on land planted to trees was made nominal and not the same as the rate on the rest of the farm property, the growing of trees would be greatly encouraged. My plan is to have the farmer report to the State Conservation Commission that he has a certain number of acres of land devoted to raising trees, the kind of trees he is growing and their condition. On the recommendation of the commission this land might be exempted by the assessors from the regular rate of taxation and a nominal rate charged. It is my suggestion that this exemption be made for a period of 30 years."

Watershed Protection

Secretary Wilson has decided that the interests of cities and towns which obtain their water from streams having their watersheds within National Forests call for special measures of protection, and he has therefore developed a plan of cooperation for the Department of Agriculture with those communities which are alive to the importance of keeping their water supply pure.

One of the recognized objects of forestry is to insure the permanence and protect the purity of municipal water supplies. As the Forests are maintained for the benefit of the public, Secretary Wilson considers it the duty of his Department to do all that it can both to prevent the pollution of such supplies and to create or maintain conditions most favorable to a constant flow of clear water. By protecting and improving the forest cover and by enforcing special regulations to minimize erosion and to provide for the maintenance of sanitary conditions, the Government will try to safeguard the interests of the public.

A form of agreement has been drawn up, providing that, when cooperation is entered into between the Secretary of Agriculture and any city desiring conservation and protection of its water supply, the Secretary will not permit the use of the land involved without approval by the town or city, except for the protection and care of the Forests, marking, cutting, and disposing of timber which the Forest officers find may be removed without injury to the water supply of the city, or for the building of roads, trails, telephone lines, etc., not inconsistent with the objects of the agreement, or for rights of way acquired under acts of Congress. The Secretary also agrees to require all persons employed on or occupying any of the land both to comply with the regulations governing National Forests and to observe all sanitary regulations which the city may propose and the Secretary approve.

The agreement provides for the extension and improvement of the Forests on the part

of the Government by seeding and planting and the best methods of silviculture and forest management, so far as the funds available will permit. The city on its side is expected to assist in the work by paying the salaries of the additional guards necessary to carry out the agreement, and in case extensive forest operations are immediately desired by the city, it would bear the major part of the cost entailed by this work.

Secured 20,000 Acres

Pennsylvania a few days ago took title to 20,000 acres of forest land in the Cumberland Valley for addition to its forest reserves, the purchase having been consummated by Commissioner of Forestry Robert S. Conklin after a long negotiation with the South Mountain Mining and Iron Company. The tract, which is known as Pine Grove furnace, is one of the old time iron manufacturing properties, the land having supplied the wood for the charcoal furnaces which made the iron in Pennsylvania seventy-five years ago.

The purchase, which is the largest single acquisition made by the department for several years, increases the area of the State forest reserves in the Cumberland Valley to 100,000 acres and makes the total extent of the reserves in the State 985,000 acres.

The land lies in Cumberland and Adams counties and adjoins the Caledonia furnace tract, formerly owned by Thaddeus Stevens and the Mont Alto furnace tract, which are now State property. It is covered with oak, chestnut, pine, poplar and hemlock and in addition to having a fine growth of timber contains iron ore, clay and sand baks and water and ice leases from all of which the State will derive an income.

City Owns Tree Farm

It is not generally known that the city of Columbus, Ohio owns and operates a tree farm, says the *Columbia Dispatch*. Such is the case, however, and it was planted and is managed by James Underwood, superintendent of Franklin Park and head of the city forestry department.

Several acres of ground surrounding the water purification plant and owned by the city, were planted with trees some time ago as an experiment, and many of them will be ready for replanting next fall. On the tract there are 1,000 elms, 1,000 Norway maples and about 6,000 different varieties of shrubs. The trees and shrubs will be used for replanting in the city parks, and later, as the supply of trees increases, they will be used in street planting.

The success the department has had so far in the growing of tree plants has encouraged it to plant for more extensive operations along this line. It is possible that part of the city land on either side of the Scioto River, north of the dam, will be utilized in this manner in the future, and that a systematic planting of trees along sidewalks will be taken up.

The forestry department has employed from six to ten expert tree-trimmers during the fall months, in trimming trees along the sidewalks, free of charge to the property owners. The territory extending from High to Parsons Avenue and from Naghten to Deshler, was covered. About 8,000 trees were trimmed, 400 dead ones removed and about 700 wagon loads of trimmings and dead trees hauled away. It is expected that the work will be continued in the early spring.

New England Trees in Winter

Prof. Albert F. Blakeslee, of the Department of Botany in the Connecticut Agriculture College, together with C. D. Jarvis, has just issued an extensive and profusely illustrated bulletin on New England Trees in Winter. In the preface the bulletin says: "At present there is no general work upon American trees which combines illustrations of the individual forms with keys for their identification based upon winter characters. The forester and lumberman, however, are more called upon to distinguish trees in winter when leaves and flowers are fallen than in summer. Trees, as the most conspicuous elements in the winter landscape, must also appeal to the student of out door life. The interest shown by classes of school teachers in the Summer School in identifying specimens of twigs collected the previous winter indicated that the winter study of trees can be taken up with enthusiasm by teachers in their schools. In our experience, the winter identification of trees has proven to students one of the most interesting subjects of their course. It is of decided value for its training in the power of accurate observation. The work comes at a time when material for natural history study seems scanty and might therefore be used to bridge over the period between fall and spring which are unfortunately considered by many the only seasons when study of out door life is possible in the schools. A tree in winter is far from being the characterless object many believe. Freed from its covering of leaves, the skeleton of the tree is revealed and with the method of branching thus clearly discernible, the species may generally be more readily identified at a distance than in its summer garb. There are many forms, moreover, that are difficult to distinguish from summer features alone but which in winter have twig, bud or other characters which make their separation comparatively easy."

A co-operative agreement entered into between the U. S. Department of Agriculture and the State of Maryland provides for an expenditure by the Government of not to exceed \$600 during the year ending December

31, 1911, this sum to go toward meeting the expenses of forest fire protection in Maryland. The areas to be protected are in Allegheny, Garrett, Washington, and Frederick counties. The co-operative agreement is made possible by the terms of the Weeks Law, which Congress passed last winter.

The funds of the Federal Government will be used solely for paying patrolmen. The State officials select these patrolmen, subject to the approval of the Department of Agriculture. The maps submitted to the Federal Government show where each of these patrolmen will be located, the approximate routes of patrol, and all matters necessary to a clear understanding of the State's plan of fire control, including the location of lookout points, telephone communications, railroad patrols, location of State forest fire wardens and other officials, and the like.

Mr. J. J. Levison, Arboriculturist for the Boroughs of Brooklyn and Queens, New York City, has recently been appointed as special lecturer at the Yale Forest School on the planting and care of street and park trees. His course of ten lectures, which form part of the work in the fall term, covers a wide and varied field. It is the first time such a course has been given in any of our forest schools; it is a needed course and several of the Yale graduates have already been placed in charge of city tree work in New Haven, Conn., and Milwaukee, Wis. Other big cities are seeking professionally trained foresters, and the prospects are that the demand for especially equipped men is on the increase.

Lyford, Clark & Lyford, Forest Engineers, is the new name under which the well-known Montreal firm of C. A. Lyford & Co. is now doing business. The members of this firm are: Judson F. Clark, C. A. Lyford, and P. L. Lyford. Mr. Clark and C. A. Lyford are also members of the firm of Clark & Lyford, Forest Engineers, of Vancouver. These two firms are at present conducting forest surveys aggregating over 500,000 acres. They report a rapidly increasing demand for their services.

For national forests in the Appalachian and White mountains, Secretary Wilson says no lands will be recommended for purchase on which options have been obtained for the purpose of selling to the government at a profit.

The Weeks law provided \$2,000,000 a year until 1915 for the purchase of Appalachian and White mountain timber lands. More than 1,800,000 acres have been offered, of which more than 400,000 have been examined and agreements have been reached with owners of 100,000 acres.

A. F. Hawes, of Burlington, Vt., state forester, has recommended to the city council the reforestation of the land around Berlin pond owned by the city, some sixty or seventy acres, to protect the water supply, and he expects that in years to come it will be a good investment on the part of the city. He recommends the planting of pine and spruce. The state will furnish the seedlings at actual cost, also plant them at cost. The trees cost about \$5 a thousand, and the expense of planting is about \$10 an acre.

Rivers and Harbors Congress

Over a thousand delegates of the National Rivers and Harbors Congress met in Washington, for several days early in December, and after hearing many enlightening discussions and several excellent papers adopted a series of resolutions. The resolutions, which were presented to the President and also to the House and Senate, urged the adoption by the Government of a board, liberal, comprehensive, systematic, and continuous policy of waterway improvement, and the continuance by Congress of the policy of annual appropriations for rivers and harbors and connected waterways.

The resolutions also urge that such waterway improvements as have been recommended by the Government engineers and approved by Congress should be completed rapidly as possible. The congress also, in a resolution, stated that the minimum annual appropriation required to carry forward waterway improvements on a scale commensurate with the importance of the work to be done is \$50,000,000.

The congress also recommended the enlargement of the powers of the Interstate Commerce Commission to the end that the the Commission may more effectually regulate competing land and water carriers, and provide for the interchange of traffic.

Canadian Forestry Convention

Last year the Canadian Forestry Convention was held in the old Rock City of Quebec. This year, under the patronage of His Royal Highness, the Duke of Connaught, Governor General of Canada, it meets on Feb. 7 and 8, in the Parliament Buildings at Ottawa, the capital city of the Dominion.

This will be a particularly important meeting. There are a number of subjects pressing for solution, the Parliament will be in session and the Canadian Lumbermen's Association will be meeting in Ottawa at the same time. It is expected that the meeting will be addressed by Hon. R. L. Borden, Premier of Canada, Sir Wilfred Laurier, leader of the Opposition, Mr. Gifford Pinchot of Washington, Mr. H. S. Graves, United States Forester, and others.

The Canadian railways have granted single fare round trip rates to Ottawa. On Wednesday evening, Feb. 7, there will be a banquet participated in by the Lumbermen's Association as well as the Forestry Association.

The Ottawa winter season will be in full swing, and visitors from a distance will find much to interest them in the Canadian capital.

Further particulars may be obtained by writing to Mr. James Lawler, Secretary, Canadian Forestry Association, Canadian Building, Ottawa, Canada.

Popular Interest in Forestry

The general increase in popular interest in the work of the forester which is steadily attracting more attention in the newspapers is added too by the following article from a recent issue of the *New York Sun*:

"Forestry as a profession has been practised in this country for only about fifteen or twenty years. Within that period, however, it has advanced greatly and it has now come to be a business as well as a profession. It has many practitioners and there are also now engaged in it concerns that will undertake any kind of forestry work, from the treatment of a single tree to the care, development and protection of extensive forest tracts.

"In the offices of such concerns it is a common thing nowadays to receive from suburban or country residents who may own perhaps a single noble tree or a clump of trees that seem not to be thriving a request to look them over. Whereupon the concern sends out a tree doctor, an expert forester, who inspects these trees, root, trunk and branch, for cavities, for insect borers, for the detection of scale, the removal of dead wood and the most advantageous pruning of the live wood, for the bolting or chaining of limbs if that should be necessary, for whatever may be needed to restore the trees to or to preserve them in sound health and their normal beauty.

"On the results of this inspection the forestry concern makes to the owner a typewritten report, and then it remains with the owner to determine what he will have done. There are owners who have their trees inspected at regular intervals as a preventive and preservative measure to keep the trees in health.

"For owners of more extensive country estates which may include within their territory stretches of woodland the modern forester does many things. Here he not only cares for individual trees, but he is as well a landscape forester. He will clear away underbrush and without destroying their woody flavor make woods accessible so that they may be enjoyed; and by the judicious removal of branches or the cutting out of a tree or two he may reveal a beautiful view."

THE ANNUAL MEETING

THE thirty-first annual meeting of the American Forestry Association will be held in Washington on Tuesday, January 9. There will be three sessions.

At ten in the morning the directors will meet at the New Willard, for the transaction of general business.

At one in the afternoon there will be a luncheon at the New Willard for the ladies and gentlemen of the Association. At this luncheon, the cost of which will be \$2.00 a plate, there will be addresses by Governor Robt. P. Bass, of New Hampshire, the President of the Association, Henry S. Graves, of the United States Forest Service, and Thomas Nelson Page. The election of officers will follow.

In the evening at 8:30 there will be a smoker at the Commercial Club attended by the members of the Association and to which prominent men of various departments of the Government will be invited. There will be a number of short addresses and discussions on forestry and conservation work.



FOREST FIRES

Fire in California

A report from San Diego, Cal., dated Nov. 29, says: "Brush fires that started early yesterday morning in the Cleveland Forest Reserve and in many places in the country east and south of San Diego are today sweeping over large areas of unimproved land. In Lower California reports from points along the border that have telephone communication with San Diego and from boats recently arrived from Ensenada are that fires are prevailing in many ranges on both sides of the peninsula.

"In San Diego county fires are raging on San Miguel Mountain, Volcano Mountain, Cuyamaca, Upper Otay, Sweetwater and Green Valleys, Lost Pine Mountains, Potrero, Treat, Campo, Black Mountain, San Dieguito River Valley and Viejas Mountain. In the Lost Pine Mountains the hoisting machinery and sheds of a mine were destroyed.

"No estimate of the damage in the fire zone has been obtained. Forest Supervisor H. N. Wholer, of the Cleveland Reserve, has every man in his employ out; the county rangers have also been pressed into service and the men employed on the big ranches in the district in question are aiding. It is hoped by tomorrow at the latest, if the winds subside, to check the flames."

Washington's Fire Losses

Eleven million feet of timber was destroyed and over 70,000,000 feet was killed by fire in the State of Washington during the summer of 1911, according to the report of J. R. Welty, Washington State fire warden, just filed with the State board of forest commissioners. Most of the killed timber is accessible and many be logged, thus causing little loss, says Mr. Welty.

During the season fires burned over a total of 86,364 acres. A total of 5,792 permits to burn slashings were issued by the fire warden and his deputies. Fifty-four arrests were made for violation of the forestry laws, and the fines and costs in connection with these arrests totaled \$1,291.05. Forty-eight out of the 54 arrests made resulted in convictions.

"Burning under permits," says the report, "was attended by little loss. The holders of permits generally exercised great care to prevent the fires from spreading beyond the limits of the slashings. About 46,000 acres of slashings were burned under permits during the season, indicating that much land is being cleared for agriculture.

"The total area burned over by these fires was 86,364 acres, as follows: Cutover or logged-off lands, 62,669 acres; old burned tracts, most of which were burned over in fires of 1902, 18,530 acres; second-growth timber, not yet merchantable, 889 acres; merchantable timber, 4,267 acres.

"Of this 4,267 acres of merchantable timber burned over 1,947 acres were killed or destroyed and 2,329 acres were not injured.

"Where second-growth timber, not yet merchantable, standing on ground suitable for timber growth only is burned, the loss is serious, but where such timber is located on land suitable for agriculture and which will in the near future be used for that purpose, the loss is light.

"Most of the second-growth timber land reported as burned over is suitable for agriculture."

The total logged-off lands burned over amounted to 62,669 acres. Of this area nearly one-sixth is in Thurston County.

In the destruction of merchantable timber Lewis County suffered the greatest loss. The total amount destroyed was 7,000,000 and the total killed 65,000,000 feet. In Cowlitz County 1,000 feet of timber was destroyed and 1,250 feet killed. In Snohomish County 1,000,000 feet was killed by fires and 450,000 feet destroyed. Pierce County lost 265,000 feet of merchantable timber, and timber measuring 250,000 feet was killed. Clarke, Perry, Jefferson, Kitsap, Klickitat, Pend, Oreille, Whatcom and Spokane counties suffered no loss.

Reducing Fire Fighting Cost

Considering the efficiency of the service obtained, Montana's fire fighting bill for the past season, under the cooperative plan inaugurated last spring, was merely nominal, according to a report submitted to the State Board of Examiners by State Forester Charles W. Jungberg.

The State has two co-operative agreements, one with the private lumber companies and the government on a pro rata acreage basis, and the other with the government alone. Under the first agreement, Montana is a member of the Northern Montana Forestry Association, operating in Flathead and Lincoln counties.

The total fire loss in this district on 194,428 acres of timber, valued approximately at four million dollars was only \$35. The cost to the State protecting its 68,721 acres in the district, valued at \$1,356,963, was but \$343.61. In the district there were six fires during the season and a total of 199 acres were

burned over, damaging 25,000 feet of timber, valued at \$35. The assessment this year was only half a cent an acre.

"The State is willing to co-operate and pay its pro rate on an acreage basis in districts where the owners of private timber lands are willing to co-operate," says Mr. Jungberg in his report. "The Northern Montana Forestry Association has a membership numbering 84, which includes all the large lumber companies and individuals holding tracts of timber in that district. While the Anaconda Copper Mining Company is not included in the Northern Montana Forestry Association, yet it has had men to patrol the country in and adjoining this district this season, and

has shown a disposition to fight fires if necessary. Fire hazard in this district is very great, owing to the large amount of timber cut during the last twelve years, and to the fact that two railroad lines tap this district in various places.

"The cost of fighting fires in three other districts is on a percentage basis, the Government paying sixty-five per cent of the cost of fighting all fires that occur, and the State thirty-five per cent. This percentage agreement covers three districts. In district number one are 180,800 acres; in district number two 483,840 acres, and in district number three 299,520 acres, a total of 964,160 acres.

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